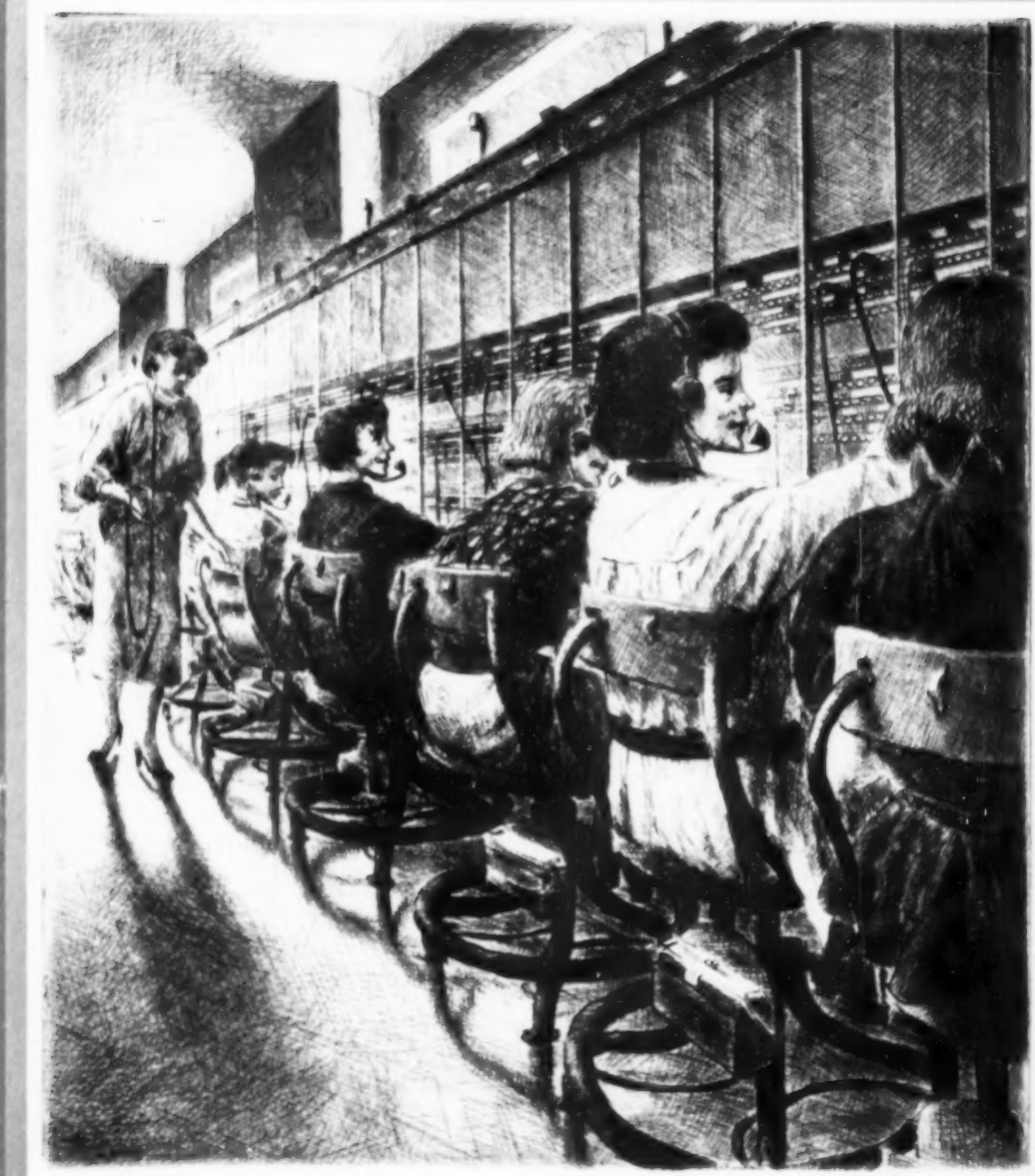
Bell Telephone MAGAZINE

SUMMER 1954



VOICES WITH A SMILE: Operators at a D.S.A. switchboard

VOLUME XXXIII
NUMBER TWO
SUMMER 1954

Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

Cover: "Voices with a Smile: Operators at a D.S.A. Switchboard." From an original etching executed for this MAGAZINE
Federico Castellon

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JUDSON S. BRADLEY, *Editor*

Published for the Bell System by the Public Relations Department, American Telephone and Telegraph Company, 195 Broadway, New York 7, N. Y.

CLEO F. CRAIG, *President* S. WHITNEY LANDON, *Secretary* JOHN J. SCANLON, *Treasurer*

BELL, *the Inventor*, and VAIL, *the Builder*

Painted by Dean Cornwell for the New England Telephone and Telegraph Company

The Alexander Graham Bell portrait shows the inventor at the age of 29, in his attic workshop at 109 Court Street, Boston, contemplating his first telephone. On June 3, 1875, this instrument first sent human voice sounds over a wire. Details of the painting were developed from sketches provided by the late Thomas A. Watson, Dr. Bell's assistant in the early telephone tests.

Bell was, first of all, a humanitarian. He once said that he would prefer above all else to be remembered as a teacher of the deaf. And the deaf were his first concern nearly all his life. When he was not teaching them, he was establishing societies and institutions to aid them, or was compiling and studying statistics of the genetics of deafness. But he had many other interests as well. In later years, he found time to support and develop aviation, and to make important experiments in sheep breeding. A water-skimming boat to which he devoted attention during World War I has quite recently been found worthy of further development by the Navy.

ALEXANDER GRAHAM BELL

THEODORE N. VAIL

The portrait of Vail shows him in the chair he used as first president of the New England Telephone and Telegraph Company and later as president of the American Telephone and Telegraph Company.

Vail, the builder, holds blueprints of an expanding telephone system, while the globe represents his goal of world-wide communications. A large man, often brusque in manner, he was the central figure in two crucial periods of telephone history: the early years and the start of the era of nation-wide service.

His activity and force for a time blinded people to his wide vision and his essential kindness. He brought to Company reports and advertising a frankness that startled his own generation but is taken for granted today. When someone once questioned the advisability of issuing a public statement on a subject then regarded as touchy, he is said to have replied, "If it's true, let's be first to say it."

Under his sponsorship the Bell companies launched their first pension and benefit plans, January 1, 1913. And it was a memorandum of his pointing out the many acts of heroism and of devotion to service on the part of telephone people that led in 1920 to establishment of the Theodore N. Vail medal awards as a memorial to him.

These recent portraits of Bell and Vail, by Dean Cornwell, hang in the Directors' Room of the New England Telephone and Telegraph Company, in Boston. They are outstanding examples of modern portraiture, and are companions in style to Cornwell's mural, "Telephone Men and Women at Work," which is displayed in the lobby of the New England Company's long distance center at 185 Franklin Street. They are reproduced here, by courtesy of that Company, for their historical accuracy and their colorful interest to all telephone people.

An editorial

COURTESY: ONE OF OUR GREATEST ASSETS

HAL S. DUMAS

Executive Vice President, A. T. & T. CO.

FROM THE VERY EARLY DAYS of our business, telephone men and women have recognized that courtesy is an invaluable element in getting along with those we serve. Perhaps the practice of courtesy started as a matter of necessity because of the very nature of the activity in which our first predecessors were engaged.

Until the telephone came along, people dealt with each other either face to face or by letter. When we speak face to face, a pleasant expression or a friendly gesture goes a long way to create good will. When we write, we instinctively take pains to make our words courteous and acceptable. The telephone, the new medium of communication, lacked the long familiarity and usage that had smoothed the way in writing and in face-to-face conversation.

It seems quite sure that the first days of telephone conversation were pretty rough as far as their courtesy content was concerned. It must then have become evident to all telephone people that, if their business was to grow and prosper and become truly useful, they themselves must set the pattern of patience and courtesy.

In the intervening years, courtesy became a habit with telephone people, and now it has become a matter of great personal pride with every one of us. The public has come to look to us as the institution where they can always expect courtesy and consideration. The courtesy of telephone people has become the standard by which those who deal with the public in every line of endeavor are measured. We have won a proud place for ourselves in the eyes of the people of our country, a place which each of us should guard zealously in everything we do.

Here is part of a recent letter from one of our customers, who was also a new share owner:

"Not long ago I had the pleasure of visiting the telephone office here. We had been charged with out-of-town messages which we never made. I was amazed at the courtesy and coöperation the girl gave me. It was only a matter of minutes until the error was tracked down.

"This incident caused me to do some thinking. If all business of the vast A. T. & T. Company was carried on this way, I wanted to be a small part of it. In the near

future we plan again to invest some more of our savings with your company."

What a wonderful job that young telephone woman did for herself and her company! She not only turned dissatisfaction into pleasure but she made for all of us a fast friend, a substantial friend who immediately showed his friendship most convincingly by investing his money in our business.

The splendid spirit of courteous and helpful service shown by this young woman does not stand alone. It is this same spirit, this pride in ourselves and in the thing we do, that is the source of the many heroic actions of telephone men and women, both on and off the job, which fill the pages of our history. It is a tradition well established in our business that service to the public comes ahead of our own personal comfort or, in great emergencies, our fears. The operator who sends help to a faint cry of distress, the plant man who uses his first aid knowledge to help the victim of an accident, all who move swiftly and surely to restore service in times of great natural disasters, are responding to the tradition of "service above self."

As striking as are these truly heroic actions, it is perhaps a greater test of fortitude when, day in and day out, regardless of our own indispositions, we serve the public so they think well of us and our company. There are undoubtedly many times when, for each of us, being courteous is difficult and trying. But it is the job we do every day, on every contact, that builds for us the firm esteem of the public without which we cannot well continue.

There was a time when almost every one of the public had a number of personal contacts every day with those who handled his calls. With the progress and efficiency which have brought such a large degree of mechanization to our business, this is no longer true. Some users of dial service may not come in direct contact with a telephone company representative for months on end.

Where once a subscriber had the fact that telephone people were fine, courteous, and helpful impressed upon him several times a day, he may now be impressed only by the speed and effectiveness of his service. And he may well attribute his good service wholly to the machines, and have a poor opinion of telephone people if his occasional contact with us is indifferent or unfriendly. If for no other reason, this should lead every one of us to try to make a friend for our business on every contact.

There is, however, another and more important reason. Our pride in ourselves and in the great public service of which each of us is a real ambassador should be always with us. The courtesy of telephone people has become a national standard, a national asset. Its continuation and strengthening is an opportunity each of us can gladly meet.

A discussion of the role of telecommunications in national defense, and of the preparations and capabilities of the Bell System for meeting its grave responsibilities

EMERGENCY MOBILIZATION AND THE BELL SYSTEM

I. INTRODUCTION

EUGENE J. McNEELY

Vice President, OPERATION AND ENGINEERING, A. T. & T. CO.

IN THE PRESENT GRAVE STATE of international affairs, it is appropriate that careful consideration be given to problems of national defense. Since the outbreak of hostilities in Korea, Bell System engineers have studied all major plant expansion with a view toward providing the greatest continuity of service possible with reasonable expenditures.

The System's multiplicity of nation-wide —even world-wide—facilities for instant voice communication places heavy responsibility on it in time of conflict. In addition to its vast networks of standard types of equipment and services, its special installations since 1945 for the Armed Forces have extended their effectiveness in three dimensions, and the signaling and warning arrangements it has originated and placed in operation for the Civil Defense organization have done much for the latter. What part the developmental activities of the Bell Telephone Laboratories and the manufacturing capacity of the Western Electric Company play in national defense may not be recounted. They have, however, been substantial.

In each of the Bell System's Operating Companies there are people who—whatever their title—have the responsibility for insuring that the communication needs of military and CD (Civil Defense) organizations are fully met. This includes a corresponding responsibility for keeping appropriate people in each telephone company aware of the defense situations and of activities relating to defense problems. In high-level dealings with both organizations, the defense coördinator is often able to call on his store of telephone knowledge and experience for suggestions and solutions which contribute to the value of our services.

At System headquarters, in New York, there is an A. T. & T. defense engineer. His dealings are, as might be expected, largely with people in Washington. He regards defense, and the provision of com-

munications for it, from the national viewpoint. That includes, of course, a liaison function which unifies all defense communications for the protection of our country.

Telephone men and women necessarily work on more or less specialized jobs in thousands of places from border to border and from coast to coast. It isn't easy to get the big picture. This article, dealing particularly with the mobilization and emergency uses of telecommunications, is written to illustrate how the units of the Bell System are united and ready, over that same wide area, to make their critical contribution to the security of our nation.

II. SURVIVAL AND RESTORATION OF COMMUNICATIONS

CHARLES M. MAPES and
COLE A. ARMSTRONG

Assistant Chief Engineer and *Customer Equipment Engineer,* A. T. & T. CO.

NOTE: *The following article is based on material which was prepared by Mr. Mapes, Mr. Armstrong, and their associates, for use by Mr. Mapes in his oral discussion of "Telecommunications in Mobilization and Emergency" in Washington on June 9 before members of the Executive Departments of the Federal Government which are directly concerned with defense matters. His talk was illustrated by many illuminated charts shown upon a screen, only a few of which can be reproduced here.* EDITOR.

THE TELEPHONE COMPANIES, Bell and Independent together, blanket the entire United States with a network of interconnecting telephone circuits. There are in service some 160,000,000 miles of wire in cities and towns, 40,000,000 miles of intercity telephone circuits.

The telephone plant is so constructed that in general it is expected to survive a bombing very well in comparison with other construction.

Cities are underlaid with a close network of underground telephone cables with great numbers of pairs of wires which would generally not be destroyed by an atomic bombing.

Most telephone buildings in cities are of unusually strong construction, and are expected generally to survive bombing better than the surrounding buildings.

Special arrangements have been made and others are now being made to minimize the likelihood of interruption of essential services in times of disaster.

Auxiliary power insures against interruption because of shut-down of commercial power.

Duplicate outlets can readily be ar-

ranged for important points to the extent desired.

The mobile radio stations of the telephone system can be used for immediate temporary service where needed. Other emergency radio telephone sets form a part of the telephone system's provision against interruption.

Over the years, the telephone companies have faced and overcome natural and man-made disasters of great variety and tremendous scope. They have a very large reservoir of trained men skilled in all aspects of plant work and used to quick action in emergencies. Large stocks of materials are available to these men, throughout a very large number of locations.

The companies, as part of their regular service provision, have developed plans for providing for the prompt restoration of essential lines and the rapid restoration of all service.

The network of intercity circuits has great flexibility to provide rerouting to maintain essential services in the event of destruction of certain sections of intercity routes.

Extensive traffic control organizations throughout the country are continually at work readjusting the routing of traffic to take care of local peak demands in emergencies.

Four Types of Plant

THE BELL SYSTEM has four major types of plant which are used to interconnect our cities.

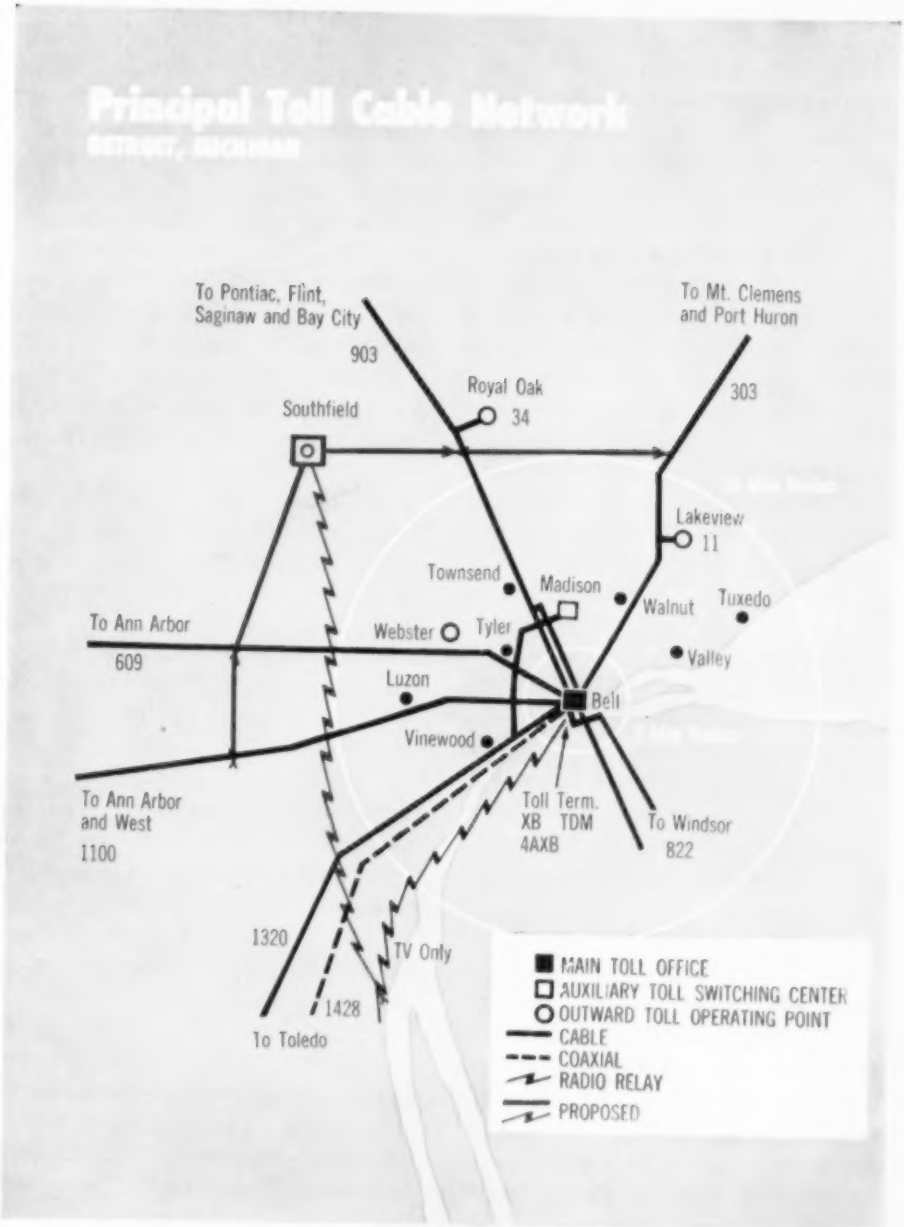
The first is open wire. Here a single pair of conductors may carry one voice channel, or it may have carrier systems applied to it which will permit up to 16 channels per pair.

The second is ordinary types of cable, with multiple copper conductors which carry voice circuits on the individual pairs and which may also have carrier systems applied to them to produce up to 10 telephone channels per pair.

The third type is coaxial cable, which provides a center conductor with a concentric tube around it permitting transmission of large numbers of telephone circuits at one time. The usual coaxial cable has eight of these tubes, and our most recent design of carrier equipment for these cables makes it possible for each pair of tubes to handle 1800 telephone circuits. Normally, of the eight tubes comprising a complete cable, only six are used for regular service, the other two being retained for spare in case of trouble. A fully loaded coaxial cable will, therefore, handle 5,400 telephone circuits. Each pair of tubes can also carry two one-way television channels and 600 telephone circuits instead of the 1800 voice channels. For a complete cable you could have six one-way television channels—three in each direction plus 1800 telephone circuits, with two tubes held as spares to meet "trouble" conditions.

The fourth type is radio relay, which requires towers at intervals of about 30 miles for transmission of either voice circuits or television from city to city. These towers usually have four large rectangular antennas, two of which face in one direction and the other two in the opposite direction. These antennas focus the radio beams on similar antennas at the next station. One of each pair is the transmitting unit, the other the receiving unit. This radio relay system will at present handle 12 one-way broad-band communications channels, and provides for a total of 3,000 telephone circuits or 10 one-way television channels—with appropriate spare channels provided for "trouble" conditions.

These four types of telephone plant are



New arrangements being provided for Detroit are typical of those being provided or planned in the large cities to increase the reliability of access to the rest of the country.

used, as appropriate, to provide the communications between cities of this country.

The Factor of Local Facilities

COMMUNICATING WITH A CITY depends also on the local facilities which are available, and the way in which intercity telephone calls reach their proper termination within a city is an integral part of the operation.

The city of Detroit, Mich., provides a typical example. There are a number of main routes coming into the city: six with ordinary cables, one coaxial cable on another route, and radio relay on the last route. The numbers of circuits on each route vary from 303 to 1428, with the radio relay system at present being used only for television; but rapid conversion to telephone is possible if that should be required. All of these facilities are terminated at two main offices in Detroit: the Madison office, to the north, and the main Bell building, at the center of the city. There are many local offices in the city which serve our telephone customers, and some of these are equipped with switchboards where operators handle outward intercity calls. A tremendous network of cable interconnects these local offices and the local offices to individual business and residence locations.

The Madison and Bell buildings, which are the present terminations of the major long distance circuits, are separated by about three miles, but they still could both be severely damaged by the type of nuclear attack which might be launched against the city. In order to guard against the loss of both of these offices and, by that, almost all of the long distance communications into Detroit, the Michigan Bell Telephone Company has decided to establish another switching center at the Southfield central office, about 14 miles outside the downtown area.

This office will be connected to the intercity routes north and west of Detroit by an underground "ring" cable. Connections to the major intercity routes to the south will be by means of radio relay. The Southfield office will have automatic switching arrangements and trunks to reach the local offices. It is anticipated that by this arrangement a maximum of protection can be obtained both into and out of the city, in order to insure that, should Detroit be badly hit, it will still have communications with the rest of the country.

A new bomb-resistant building is now being constructed by the Michigan Company, and present plans call for completion of the dispersion arrangements by the middle of 1956.

Similar arrangements have already been made in Washington, D. C. There are five regular cable routes into the city, two coaxial routes, and three radio relay routes. As originally conceived, all of these routes would terminate either in the downtown switching center at 13th Street or at the uptown center near Dupont Circle. These offices would then feed the incoming calls to the local offices and collect outgoing calls from these offices for distant cities.

These two offices are within a distance of about two miles of each other and, in case of a successful attack on Washington, they both might be put out of service simultaneously. In order to guard against this happening and interrupting intercity telephone service in and out of Washington, the Chesapeake and Potomac Telephone Company began some time ago to provide for alternative arrangements.

Three dispersed switching centers have

been established, at Hyattsville, Silver Spring, and Arlington. These switching centers are on the main routes coming into Washington, and terminate approximately 25 percent of the intercity circuits entering and leaving the city. These switching centers have trunk facilities to the various offices in the metropolitan area. This is not a standby arrangement: *it is working daily*. In other words, 25 percent of the intercity traffic in and out of Washington is handled by these dispersed offices every day. Consequently, in case of an emergency no time would be required to put them into service.

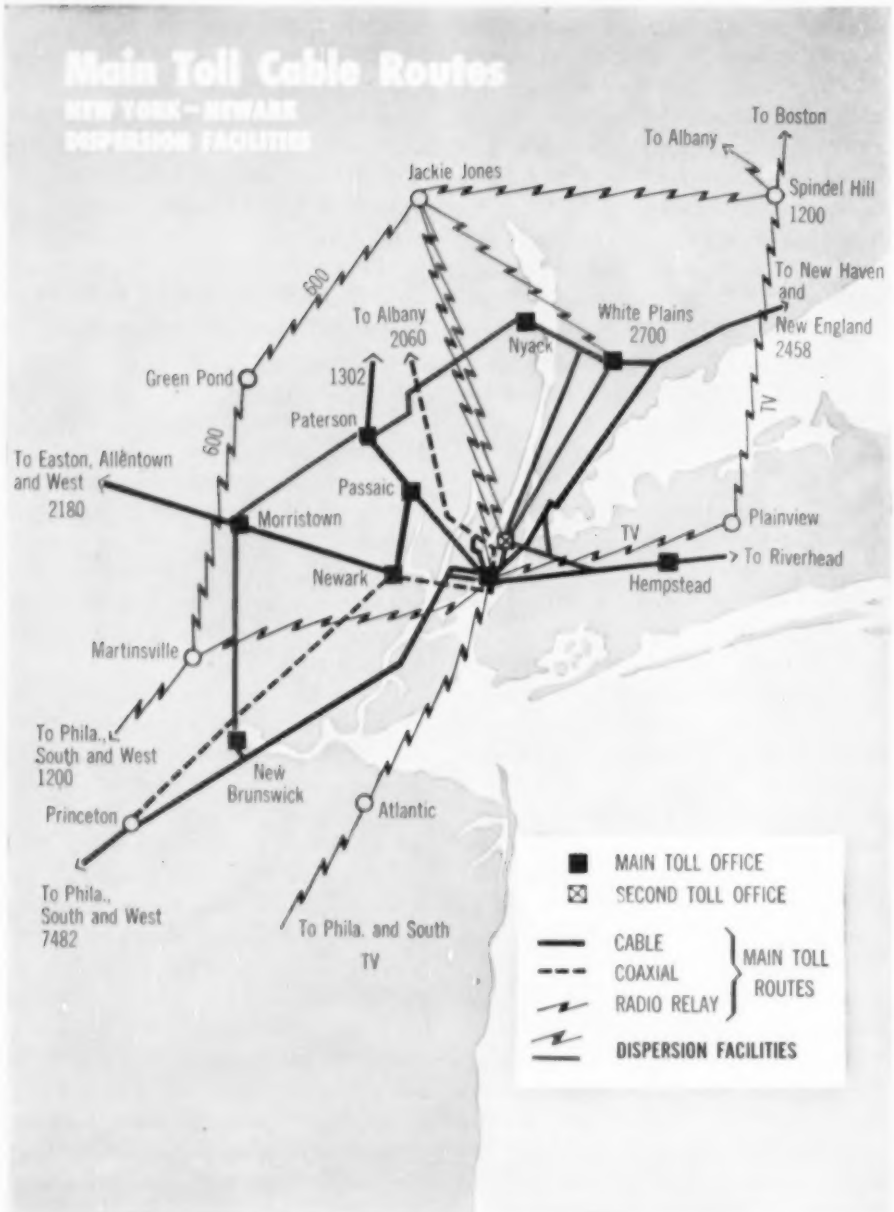
Bypassing the Cities

New York City has also been handled in somewhat the same fashion. There are about 14 incoming routes, having circuit facilities ranging from 1,000 to 4,000 and carrying both through and terminating circuits. The total terminating circuits in New York City are about 11,000. New York has one large long distance office, and another smaller office about three miles uptown. New York is fortunate, in a way, that it has a large metropolitan center, Newark, fairly close to it. For since Newark has direct trunks to many of the New York City local offices, it in itself affords an amount of intercity dispersion which is quite helpful.

However, taking all factors into consideration, it seemed to the Bell System that additional protection should be afforded. Plans were initiated some years ago to establish a second long distance center outside New York City, at White Plains, which is about 23 miles north of Manhattan. The building for this center is complete and the equipment is being installed, to be in service toward the latter part of the year. It will serve about 2,700 L.D. trunks to most of the major toll switching points in the United States and Canada. It will also have a "ring" cable which goes across the Hudson at Tarrytown to the west for 12 miles and then south to Paterson and Newark, and also eastward to Stamford, Conn. This cable will afford connections to practically all of the main intercity routes into New York. It will provide continuous dispersed service for day-to-day traffic and, consequently, will not need activation in case of an emergency.

Incidentally, both the White Plains building, already built, and the Southfield (Detroit) building, now a-building, are constructed of reinforced concrete for the outer walls, the floors, and interior partitions, and with small window openings, to resist bomb damage. This type of construction is in accordance with the recommendations of the Federal Civil Defense Administration (FCDA).

One of the important considerations in the design of an intercity network is the ability to bypass possible damage in cities. Such a bypass arrangement is provided for New York. The radio relay link coming down from Boston has a tower about 35 miles from New York City, at Jackie Jones Mountain. This tower beams its radio energy at the downtown Manhattan building of the Long Lines Department. But facilities have also been provided and are in daily use to bypass the location in downtown Manhattan and go directly to another tower in north central New Jersey. This bypass is also in operation daily and does not need any special activation. When the White Plains dispersed center is in operation, about 25 per cent of the total daily traffic into and out of New York City will be handled at centers off Manhattan Island.



Second long distance switching center and by-pass routes in the world's largest metropolitan area. Should New York City be bombed, the area still has access to intercity networks.

This partial picture of possible routes between Boston and Washington illustrates how several major intersections of a network can be destroyed without cutting off essential communications.

The matter of bypassing cities is of great importance. Yet, thanks to the Bell System network, bypassing loses some of its significance when it is realized that alternative routes in great variety are constantly available for communication between any two major points in the country. A typical example of routing around New York City would be for a call from Boston to Washington. The normal route might be from Boston to New York, Philadelphia, Baltimore, and Washington; but if something happens to New York, the alternative route via the radio relay towers 35 miles away from New York City might be used. Again, if another route is desired, it is possible to go from Boston to Albany, to Buffalo, to Cleveland, to Pittsburgh, and to Washington; or, there are routes from Syracuse to Harrisburg or other cross-country routes which can be used. These are smaller routes, of course, and would not be the primary bypass.

The important point in all of this is that, with vacuum tube repeaters, carrier systems, and modern transmission techniques, it is no longer necessary to depend on the size of a copper wire to get good voice communication. The question of longer distances requiring larger wires or special loading to get satisfactory transmission is no longer important. It is now possible to connect many links together of the type provided by basic carrier, coaxial, and radio relay systems, and get just as good transmission as would be expected from a single link of this kind. The Bell System uses this fact many times in its day-to-day operations to provide relief for congested traffic situations by alternative routes through longer but, at the moment, less used paths.

Major Long Distance Routes

So FAR, we have talked about the major long distance routes feeding some of our important cities.

The nation-wide picture of the major long distance routes is on a vastly greater scale. There are seven transcontinental routes: four of them open wire; one of a cable equipped with the ordinary type of carrier; another of the coaxial cable type, along the southern route; and finally, a radio relay route spans the country from coast to coast. A major addition will be another radio relay route across the southern portion of the country, terminating at Los Angeles.

The total facilities which are available in the major routes throughout the country are many. Between East and West there are approximately 3,700 circuits working today. In some of the more congested areas, such as between New York and Philadelphia, there are 8,200 circuits working, and between Cleveland and Chicago over 4,400 circuits. Furthermore, the basic facilities on these major routes are such that additional circuits can be established quite quickly—since the cable or the radio relay towers are already constructed. For example, a radio relay system will handle 3,000 two-way telephone conversations when fully utilized. Only a small part of our existing radio relay systems is so loaded. Additional circuits on these routes require repeater and terminal equipment at the various points along the line, but do not require major construction.

In addition to micro-wave radio relay facilities, there are other radio systems which also afford substantial help in emergency conditions. The Bell System has available as stand-by equipment approximately 100 radio systems, scattered

throughout the country, which can be used in emergencies to bridge the gap which may have occurred in wire lines or cable as a result of some disaster. These facilities are of a single-channel variety, and will not now take care of multiple-circuit requirements. But the Bell System is currently adding to its emergency radio facilities with a new design of portable equipment which includes portable aluminum towers that can be erected within an hour at a spot where the toll circuits have been damaged, and the necessary radio equipment set up. Work is progressing to provide facilities which can make this single channel a multi-channel arrangement by the application of carrier equipment.

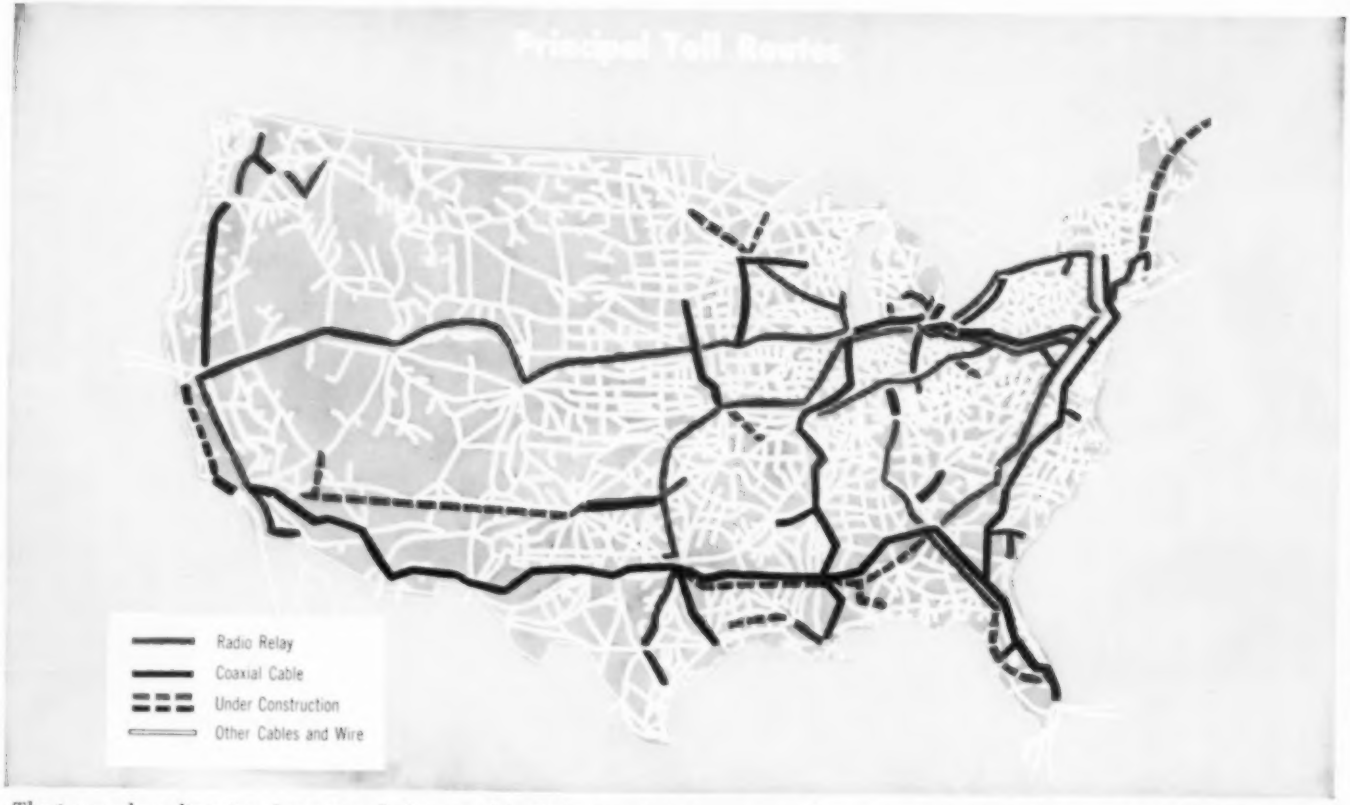
Another important feature in connection with emergency operations is mobile radio equipment. The Bell System provides service to 23,000 mobile stations. About half of those are private systems, and the balance connect to the regular commercial telephone network. These will provide a very important element in the work immediately after any substantial bomb damage to the larger cities of the country. Currently, facilities are provided in all but seven of the critical target areas designated by FCDA.

As is the case with cable construction, the time-consuming part of building a radio relay system is in getting the sites, building access roads and towers, and making an adequate power supply available. When this is done, the addition of circuits is reasonably simple and can be done quite quickly. As the intercity business of the Bell System expands and the needs of its special customers, such as the military forces, power companies, pipe lines, railroads, and others dictate the use of radio facilities, more and more of the populated areas will have radio network possibilities.

Overseas Services

ANOTHER OF THE SERVICES which the Bell System provides is the overseas radio channels. Our part of the overseas communication job is to provide facilities for telephone service only. This is now done by radio circuits connecting the United States with various parts of the world through radio channels originating from transmitter and receiver sites near New York to the East, near Miami to the south, and near San Francisco to the west. Connection is made with the Army transmitters and receivers at Seattle for communications to the north. There are about 150 direct radio circuits, and they interconnect with other places on the various European, African, Asiatic, and South American continents.

Communications are available to most of the civilized world. Commercial service was opened in 1927, and has expanded substantially ever since. However, in spite of very great technical advances in the electronic art, the establishment of reliable communication to Europe by radio has not been completely successful, because magnetic storms do at times completely interfere with both voice and telegraph communication. A voice cable between the continents of America and Europe has been considered for many years, but it was not until recently that suitable techniques were developed to the degree which would make such a cable practicable. In the latter part of 1951 and early 1952, discussions were held with military and government people in this country, followed later by negotiations with the British Post Office and with the Canadian communications people looking toward the construction of such a cable. These



The tremendous diversity of routes and of types of facilities now in existence provides means of handling the essential traffic following all but the most devastating attacks. The extent to which additional protective measures are necessary is one of today's pressing questions.

negotiations were successful, and work on the technical details and the route has been begun.

As might be expected, the selection of the route was a most important part of the construction plans. The cable cannot go directly from the United States to England because of the inability to supply power from the two ends for the number of repeaters which would be required to get satisfactory transmission. Therefore, a stop at some intermediate point for power reasons is called for. There are two possibilities: to go from New York by way of Newfoundland to England or Scotland, or to go from New York by way of the Azores to England.

Consideration of all the many hazards involved led us to choose the route from Newfoundland to Scotland. It runs north of existing cables, but goes through a minimum of pack ice and misses most of the trawling grounds, and it is the shortest practical route.

The total length of the main link in this route is about 1,800 miles, and it is planned to lay two cables, one for transmission in each direction. These are to be started in 1955, with the laying completed in 1956 and service some time late in 1956 or early 1957.

The link from Newfoundland to Nova Scotia will also be of submarine cable; but from Nova Scotia on into Portland, Maine, it is planned to use the conventional type of radio relay system generally employed in this country. Initially, there will be 36 voice circuits in the cable, but we will, of course, be searching for ways and means to increase this number.

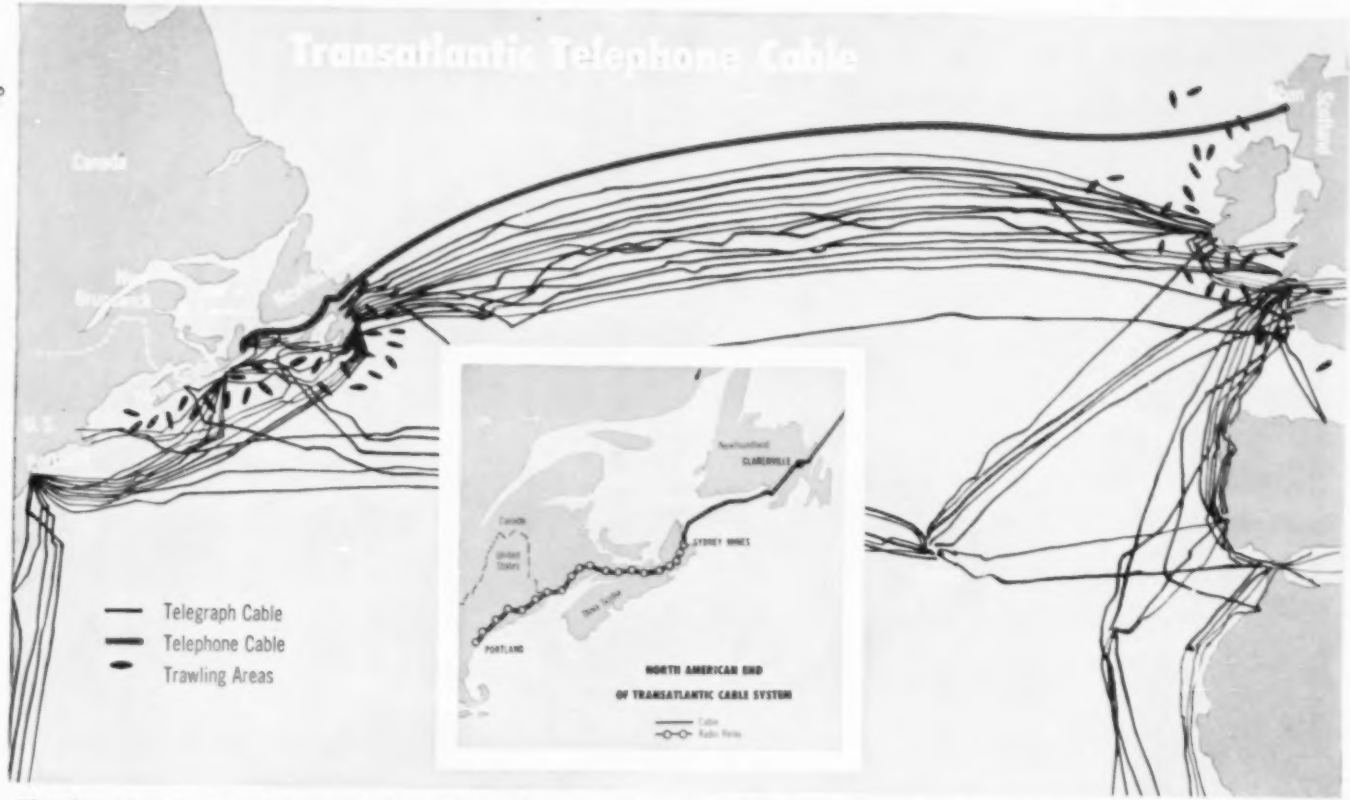
To provide adequate communications, it will be necessary to install underwater repeaters in the cable at intervals of about 40 miles. These repeaters will have three low-power vacuum tubes and will be of a character which will last for many years without attention. Such repeaters have been in operation in the Key West-Havana cable for four years, and so far no troubles have been encountered. Our aim is to design the cable to last for at least 20 years without attention due to defects in its manufacture, construction, or failure of its operating parts. Extensions to the rest of the continent will, of course, be possible.

"Operation Alert"

A WORD OF CAUTION may be necessary at this point. For if the most extensive type of attack which is visualized should occur, there would be serious interference with the intercity communications now established in this country. For example the exercise ("Operation Alert") recently carried out by the FCDA people assumed 46 bombs on 41 of the country's principal cities. This is a devastating attack, and the results of the exercise indicate that further action is required for the protection of communications. Many of these cities are on important Bell System long distance routes, and many of them would be interfered with, since ring cables, bypasses, or other protective measures are not available as yet in many of the major cities.

Ways of making arrangements for the protection of the important circuits through these cities are known, and will be discussed with the military people and other government agencies in an effort to arrive at the best conclusion as to what further protection measures are essential.

Under the assumptions of "Operation Alert," (last June's FCDA exercise) the private line Civil Air Defense Warning network, now in operation to warn the nation of an impending attack, would suffer



The planned route of the first transatlantic cable is laid out so that it will minimize the hazards of ice, trawlers, and existing telegraph cables.

substantial damage by the accurate strikes of the 46 atomic bombs. In this case, however, arrangements have been made to back up this network by calls placed over the regular message circuits used in our day-to-day business. The possible reroutings available to operators are many, and such calls can frequently be put through where a fixed private line network requires patching arrangements at various points and takes some hours to restore.

This arrangement gives fairly good coverage, but does suggest further study if we are to assume conditions in accordance with this exercise. Combinations of radio, bypass arrangements, and other protective measures are known, and it is entirely a matter of taking a calculated risk or of making the necessary arrangements to provide greater security. Should substantially complete reliability be essential under the extensive bombing conditions assumed, large expenditures will be needed.

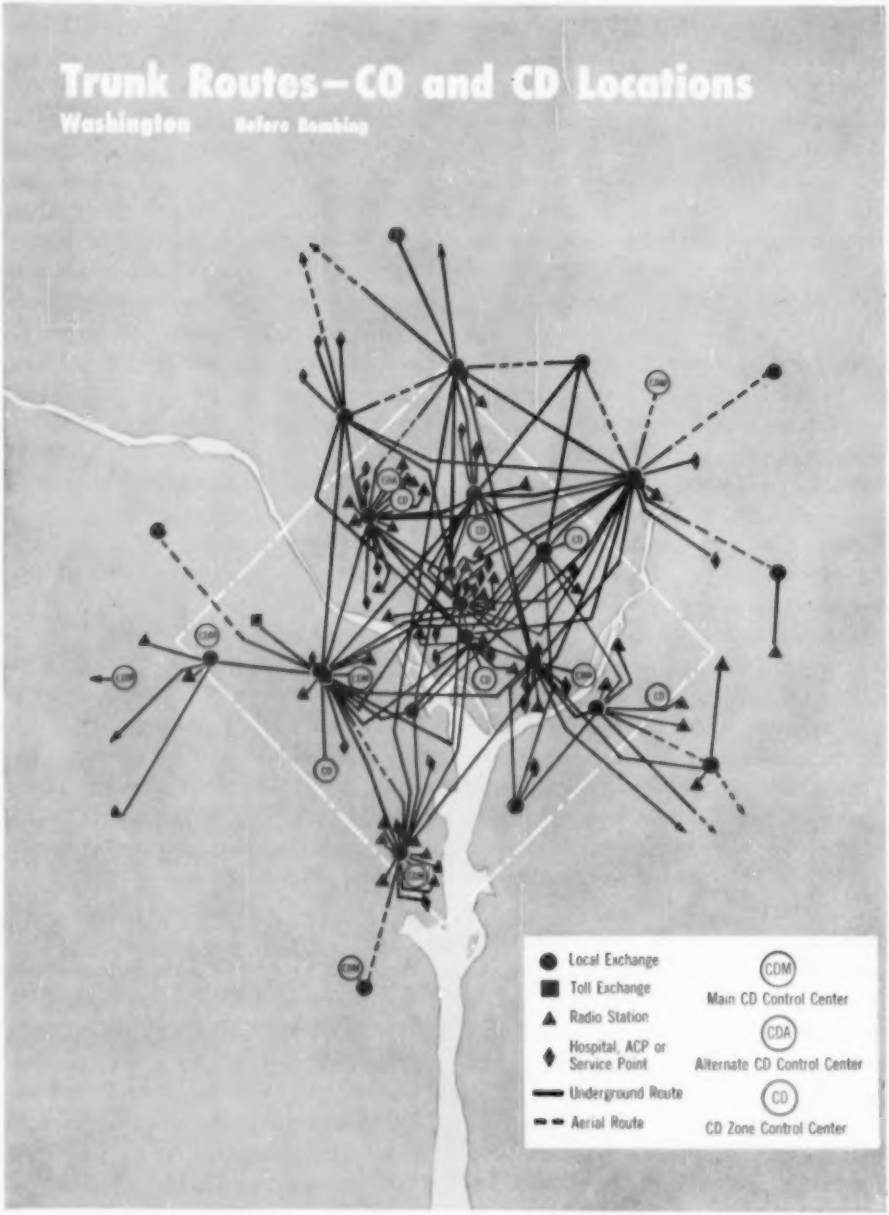
We in the Bell System will look closely at all measures which can be taken within the scope of our normal service provision to afford additional protection under such conditions. We also plan to review carefully our existing routing arrangements, and in our plans for the future will take advantage of all possible measures to improve the protection of vital military-civilian services. The expenditure of the total amount which would be required for complete protection to the extent that such protection can be afforded would be substantially beyond our current thinking as to our responsibility without some aid from the customers who require the security that makes such construction necessary.

What happened to the Western Electric Company under assumptions of the 46 bomb attack is of interest. The Western Electric Company currently employs about 102,000 people. It has plants at 16 locations, which are dispersed over the eastern part of the country. While some of the factories are fairly specialized in the products they manufacture, there is a good distribution among the various locations. In addition to the manufacturing locations, Western has 29 distributing houses throughout the country. Since Western is shipping some $900,000,000 worth of goods a year to the Bell System companies, its monthly output is around $75,000,000. This is a very heavy going rate of goods, and, together with the current stock situation, which currently is running around $100,000,000, affords a tremendous reserve of materials and equipment always in transit. And the 46 bombs did relatively little damage to Western's plants and distributing houses.

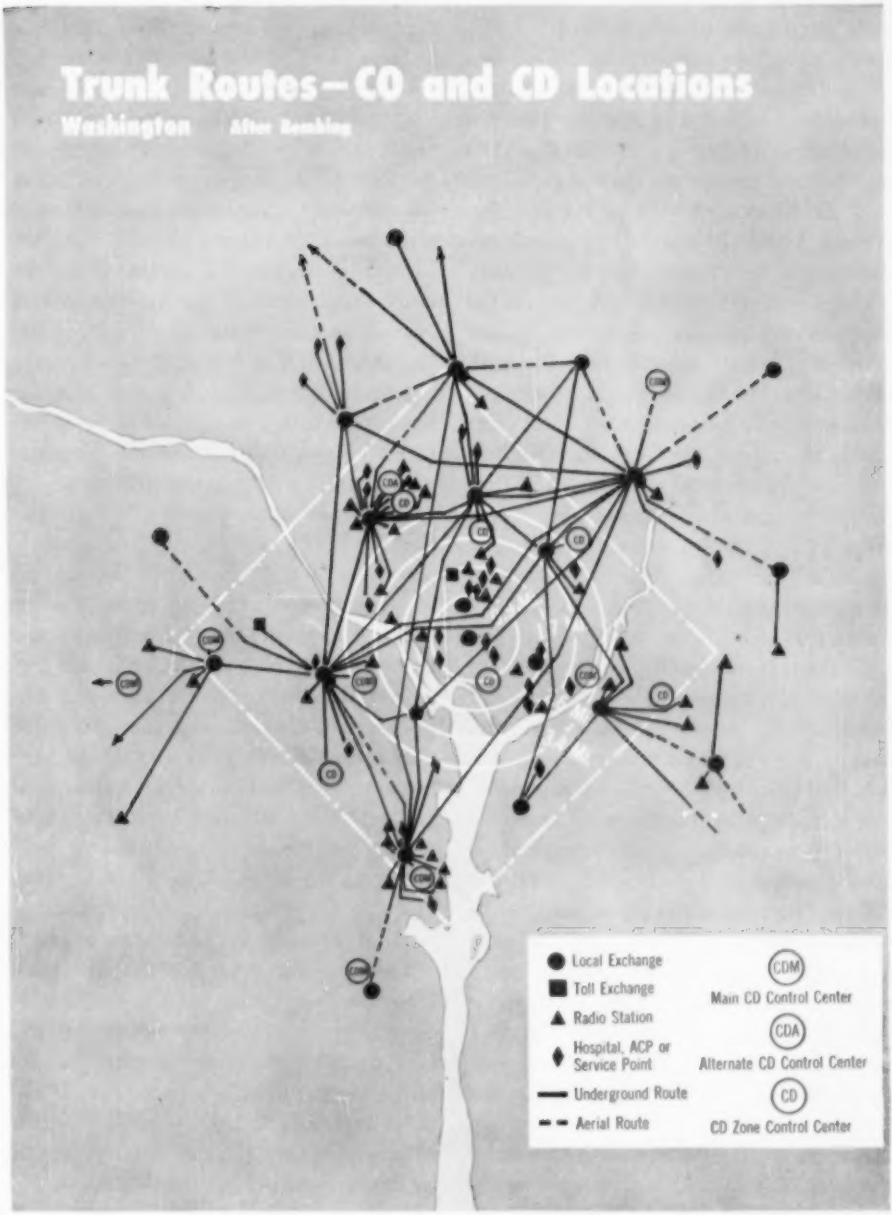
Communications within Cities

Communications within our larger cities is part of the whole problem. It is important particularly with reference to what can be done under emergency conditions —that is, under conditions following a nuclear attack. Baltimore may be taken as a representative situation.

Working in association with the Civil Defense people at all levels, we have developed recommended arrangements which, if installed, will go far to aiding the civil defense work after an atomic attack. Communications will be almost the key factor in good disaster control, and the Civil Defense people have established control centers at locations some distance from the downtown area. These control centers are, in some cases, connected to two of the local central offices. This provides diversity protection in case the main office to which the control center would normally



This schematic diagram shows the trunk routes, principally underground, interconnecting Washington central office buildings and serving the Civil Defense control centers.



A bomb explosion over the center of Washington would destroy or damage enough central office buildings to interfere with but not to completely destroy essential communications.

be connected is destroyed. Communications from these control centers to many of the operating units within the city are necessary, and are handled through a vast network of underground cables. Communications to higher echelons of the state and regional centers are also required.

Under an assumed attack such as "Operation Alert," a large part of the downtown center of Baltimore would be completely devastated. As you get to the fringes of the devasted area, you encounter conditions which require most intensive rescue work. Based on the assumptions of a direct hit in "Operation Alert," Baltimore would lose seven of its local central offices. The rest of the central offices would still be in operation, and communications would be provided between the remaining offices by undamaged trunk routes. The numbers of trunks between offices would vary between two and 1,600.

The telephone buildings involved are all of steel frame or reinforced concrete construction, and are built heavily to carry a floor load of about twice as much as standard office buildings. Generally speaking, telephone buildings would stand up better than most of the buildings in the areas in which they are located.

Certain central offices around the fringes of the disaster area are assumed to remain in service. For example, the University office, to the north, has a serving area extending into the devastated section, and would, therefore, be able to furnish communications on the fringes of the disaster area from existing telephones that were in buildings not completely destroyed or by the extension of field wire lines into the area. It would in turn be able to extend these communications to the remaining control centers or other points of operation and would have trunks to the toll restoration centers for contact with other cities if necessary.

Power for Bell central offices is supplied by large storage batteries, which are normally charged from commercial power services. These batteries have reserve capacities of from four hours to a number of days. Should commercial power fail for a short time, the batteries would carry the load. Longer failures are cared for by emergency diesel or gasoline-driven generators installed in the larger offices and by the provision of portable engines which can be rotated among the smaller offices to keep the batteries charged. There are about 2,500 permanent installations and 2,000 portable units in the Bell plant.

Atomic Tests

Experience with the early atomic explosions, and recent tests at the Nevada proving grounds, where the Bell System participated in tests conducted by the Signal Corps to find out the resistance of telephone plant to atomic explosion, indicated that for an air burst at any where near optimum height, the underground cables and manholes will not be destroyed. A ground burst of an "A" bomb, and possibly a very high powered H bomb at low altitude, would produce a crater, with consequent damage to underground plant.

The significance of this cable network is that, as long as the central office building and equipment is in operation, it would have many possibilities of serving the disaster teams of the CD organization. If the central office is destroyed, magneto local-battery telephones can be interconnected by its use.

Supplementing the land line communications would be the mobile radio transmitters and receivers in Baltimore. It may be assumed that some of these locations

are destroyed, but the remaining stations would provide some service.

Many more details of Civil Defense planning are covered by pamphlets issued by FCDA and by the Bell System for the assistance of local Civil Defense organizations. The objective is to provide as well as possible for operations under emergency conditions—but to do so with a minimum of expense during peace time. Basic communications which can be rapidly augmented by conversion of facilities normally devoted to regular commercial purposes appears to be the best way of preparing for Civil Defense operations.

To improve further the security of vital communication, the telephone companies offer to Civil Defense organizations and military bodies arrangements whereby important circuits within a target city, or the parts of the circuits within a city, can be placed completely underground.

Much more needs to be done in adequately preparing for the Civil Defense job throughout the country, but we believe we know how to do it. The problem is to balance the expenditures for such protection against the risks involved. In other words, it is again a matter of the "calculated risk." So far, such expenditures have not been large at either the local or national level.

It is not possible, for obvious reasons, to be specific as to government and military services and their use of the Bell System organization and its communications.

Present Government Services

Of the total intercity telephone circuit miles available in the Bell System, about 1.5 per cent are currently in use by the military. Of the telegraph miles, about 3.6 per cent are in use. For telephone instruments and teletypewriters, the percentages are .8 and 9.9 per cent respectively. The important point here is that present military usage is a very small portion of the total available plant. In other words, in the operating field there are tremendous reserves ready for instant use by the military people.

The various military services are, however, using some of the principal private line networks. The Air Defense Command has the largest telephone network at the present time, comprising some 132,000 miles of full-time circuits, with 73,000 miles of so-called "engineered" circuits. These engineered circuits are facilities which it has been determined by the Air Force are not needed for peace-time operations but would be required immediately under an emergency. Arrangements have been worked out between Bell and the Air Force to establish these additional circuit facilities on very short notice. It is anticipated that the 73,000 miles of engineered circuits can be taken out of the regular commercial intercity network and placed at the disposal of the military people within one hour of notice to the Bell System. Exercises to test this capability have been carried on over the last two years, and while the one-hour goal has not quite been reached, over 95 per cent of the circuits have been established within one hour and the balance within two hours. The military organization is, of course, not charged for the engineered circuits when they are not in use.

Problems of protecting military networks are similar to those described for CADW. With many military posts located outside of the larger cities, there is a further problem of getting their service to the main long distance network in case the regular serving office is destroyed. One method of accomplishing such protection is to estab-

lish transfer relay arrangements in the cable vaults or in manholes—as appropriate—which would reroute the important circuits from the military base to a more distant city under control of the base commander. For example, two routes from the base to the long distance office afford additional protection against damage to the local cable facilities. Each of these routes could be equipped with transfer relays located in underground spots which would extend the military circuits to another intercity office.

In the tests previously referred to, transfer relays satisfactorily withstood air bursts of the A-bomb.

Another way of protecting an important military location is by giving the location access to more than one of the Bell System long distance offices. This can be done in cases where the site is of sufficient importance to the military to warrant constructing a second route.

Another important phase of military operations which requires reliable communications is the necessary interconnection of the various anti-aircraft and NIKE batteries which are currently being installed to protect some of the larger cities. In such an installation, there is a central anti-aircraft operations control point plus several subordinate points which provide for the defense of pie-shaped sectors covering the entire territory. Under intensive bomber attacks, the central AAOC relinquishes control to the subordinate AAOCs.

Communications are provided by both wire and radio. One facility backs up the other but both are used for regular operational purposes. Continued operation is possible even if one of the services is interrupted.

In addition to the preparations which have been outlined for guarding against interruptions to service at all times, the telephone companies have prepared restoration plans for all of the important long distance centers. By this we mean that, assuming the long distance center building was destroyed in a large or small town, plans are available for picking up intercity circuits to other cities at outlying locations. For the smaller towns, this merely means bringing some of the wires out at a junction box somewhere on the outskirts of the town. For larger towns it may mean that wires are terminated in certain of the smaller outlying offices to which can be connected magneto telephone sets which provide their own ringing and can thereby establish communication to the next town. All of these factors go to make up a unified system designed to give a maximum of service continuity and to provide for rapid expansion when necessary.

FOR ALL THE REASONS here recounted, the telephone networks form the best basis for meeting the communication requirements for civil defense, for military operations, and for other government necessities either within a city or country-wide.

If in certain situations additional facilities beyond those now available appear to be needed, they will be most effectively used if they are associated with the present telephone system and thus have the advantage of the flexibility of interconnection and the responsibility of the large construction, maintenance, and operating forces of the Bell Telephone Companies.

As a final item, the will-to-do of the telephone forces is as great now as it ever has been. It is their intention to devote their energies and their efforts and their scientific ingenuity to the best of their ability to the number one job which is national defense.

A revolution in record-keeping procedures will one day be required to cope with the sheer magnitude of the System's expanding bulk of detailed operating data

WHAT ACCOUNTING SEES IN ITS CRYSTAL BALL

FREDRIC M. BIATHROW

Supervising Accountant, COMPTROLLER'S DEPARTMENT, A. T. & T. CO.

THE FEBRUARY 1942 issue of this MAGAZINE carried an article entitled, "Bills for 13,000,000 Customers," telling of the work involved in billing our customers for telephone service. In retrospect it seems unlikely that anyone could have foreseen, a dozen years ago, the tremendous growth all across the country which would result today in the number of Bell System customers reaching a total of 30,000,000.

Month after month, on predetermined schedules, some 32,000 telephone people see to it that the bills go out—promptly and accurately.

However, the job of preparing and issuing customers' bills is only a part of the Accounting Department's broad contribution to the work of the Bell System. As telephone people throughout the nation go about the day-to-day job of furnishing service, their combined efforts leave behind billions of individual records: central office equipment placed, long distance messages completed, hours worked, buildings constructed, old equipment retired, telephones installed. In fact, the list is seemingly endless. Most of the data these records represent have to be processed into a final form, be it a customer's telephone bill, inventory record, payroll, or administrative or financial report.

Let's look for just a moment at what steps have been taken by accounting people to cope with the problems arising from the mounting volume of records work.

In the early years of the telephone business—in the days of the pen and the ledger—all data were handwritten. In those days the fortunate individual with the Spencerian hand was looked upon with envy by his associates. As the country grew and prospered, so grew the need for faster communication and began the day of enginoering marvels. Paralleling the advances in telephone technology were the invention and manufacture, by commercial firms, of machines and equipment to handle the records work of the nation. As machines became available, Bell System people studied every possible application, and those suitable for our kind of business were acquired. But still the operations are largely manual: people run typewriters, adding machines, payroll machines, and many other kinds of equipment. Each of these many machines performs but a sin-

"In the days of the pen and the ledger." A telephone company accounting office in the early days of this century.

gle function, and their input and output are governed by the human limitations of the people who operate them.

As punched card equipment was developed, it too was acquired for Bell System accounting work, and is being used today for many jobs. For some time, people thought that this might be the answer to the problem of handling the growing volume of records work. By using a machine similar to a typewriter, original data can be punched into a card in the form of codes. Then relatively high-speed machines are used for sorting, computing, and printing the results. Our experience indicates that, while punched card methods have many economical applications to the accounting job, they also have their limitations.

As long as present recording procedures are followed, thousands of people will continue to sort and process toll tickets, cash payment and service order records by dealing with one piece of paper at a time—an individual ticket, payment stub, or service order. Automatic Message Accounting (AMA) equipment is being installed at numerous locations across the country as additional areas are opened for customer dialing of multi-unit and toll messages. Ultimately this equipment will automatically record a large volume of traffic which is now recorded on tickets. Helpful as this will be, it still leaves a tremendous amount of record-keeping to be performed by means which do not permit mechanization.

Out of the Accounting Department's experience has grown the firm conviction that the problem of mechanization will not be satisfactorily solved until a means has been found to record original data in

The service order unit in a modern accounting office. Service orders are processed one at a time.

a form which can be automatically transferred to a medium suitable for use with automatic equipment.

If the machines and equipment known today are inadequate, what does the future hold? Can the Bell System meet the challenge of the ever-increasing growth in record-keeping which we believe lies ahead?

Revolutionary Procedures Needed

To cope with the future, we need a revolution in record-keeping procedures. Improving present methods no longer appears to be good enough. We need to find new and different means of recording and processing the tremendous volume of detailed data that the System necessarily produces in the process of furnishing an ever-improving service to our customers.

Where will we find a new and revolutionary concept which will provide a solution? We are looking to the technical knowledge of the electronic engineer for our answer. Can we build an electronic accounting system designed to handle the kind of records which, in large measure, are found only in telephone business?

Before we take a layman's look at how such a system might operate, let us analyze the customer's billing job to see what is involved. For each customer we must:

- Establish and maintain a record containing his telephone number, name, address, service furnished, and the amount of his monthly local service charges.
- Process the records of his calls to places beyond the local metropolitan area which are to be detail-billed on long distance service statements.
- Process the records of his calls to nearby places which are to be billed in bulk.
- Change the status of his account each month to reflect payments and adjustments.
- Print a new bill each month which will contain all the current charges due the company.

As we analyze these separate operations, we find that computing, sorting, and printing functions are the basic requirements.

We need computing for such operations as determining the total charge for equipment furnished, pricing toll messages, applying excise taxes, and crediting cash payments to customers' records.

We do sorting to arrange data in an orderly sequence, usually by the digits of the telephone number.

Printing is required for the preparation of toll service statements, customers' bills, and reports.

There we have the principal ingredients: compute, sort, print. It sounds simple. It is simple until you realize that last year tickets for some two billion L.D. messages were handled by the Accounting Departments of the Bell System and some 360,000,000 bills were issued to customers. In "handling" the toll tickets, seven different people looked at each ticket in order to determine the charge, record for settlement, sort into telephone number order and verify, prepare a long distance service statement, and finally, total the charges for each customer. Thus, the two billion became *fourteen billion* for processing purposes. It's the magnitude of the work which creates the problems rather than the complexity of any one operation.

The equipment we need must, therefore, be able to do simple arithmetic, sort the data, and print the results in a final form.

Electronic Computers and Common Control Switching Systems

MUCH HAS BEEN WRITTEN and said recently concerning the possible use of commercial electronic computers for general business purposes. The development of these machines received its greatest impetus from the need for quickly solving mathematical problems arising from military defense requirements. Guided missiles, radar, supersonic airplanes, rocket performance, gunfire control—all require tremendous amounts of mathematical computations. From the universities and from the industrial laboratories came ideas and computer equipment to meet the need.

Perhaps the ancestors of the computer

The long distance service statement unit in a modern accounting office. Individual toll service statements are prepared on the typewriter.

AMA (automatic message accounting) equipment. It records customer-dialed calls.

art as it is known today are the common control switching systems used so extensively in the Bell System. These systems, which were developed in the early '20s for switching local dial telephone calls, have now reached a point where it is possible for some customers to dial individual telephones in certain distant cities in the United States. These huge mechanical "brains" accept dialed destination instructions, automatically search out the most desirable route from the many which are available, and find the particular called telephone from the millions of possibilities. The Bell System first produced a digital computer for scientific calculations in the middle '30s, and has continued to take an active interest in the fundamental development of these and similar computers for the armed forces.

One of the first so-called "thinking" machines to receive wide publicity was the Mark I, built in 1944 by the IBM Corporation and presented to Harvard University. A giant in size, it was also a giant in performance—in that in a few minutes it could solve problems which would take months to solve on conventional computing equipment. Many universities and commercial firms have developed equipment in the electronic computer field, until today we have machines known as BINAC, CALDIC, EDVAC, EDPM, UNIVAC, and many other identifying names.

Of these computers, Remington Rand's UNIVAC has probably received the widest publicity as a result of its television appearance forecasting an Eisenhower landslide early in the evening of election night, 1952. As the world soon knew, the scepticism with which its forecast was greeted was unfounded, and the final election results closely approximated those predicted. The flexibility and wide adaptibility of electronic "brains" was demonstrated recently when the IBM "701" was used to translate Russian sentences into English on the basis of a formula developed by Georgetown University.

Outside of Bell System switching systems, the emphasis in building the contemporary computing "giants" has been

on the solving of complicated mathematical problems involving relatively limited amounts of original input and final output data. Commercial firms are currently developing equipment designed for more general business use. Although these developments hold great promise for record-keeping work, they do not solve our basic problem of recording the original data at the source in a form which can be handled by electronic equipment. Nevertheless, they have demonstrated the commercial feasibility of such components as the magnetic tape, magnetic drum, and other storage devices, together with the electronic circuits which tie them all together into a processing system.

Electronic Equipment Designed to Meet Our Specific Requirements

AND SO THE REVOLUTION for which we are searching appears to lie in the development of data-processing equipment utilizing electronic components and principles and designed to meet our specific requirements. But how might we solve the problem of recording the original data in a medium suitable for use with automatic electronic equipment?

Today most people are familiar with the use of magnetic tape for recording voice and music. Although the principle of magnetic recording has been known since 1898, it is only in recent years that it has been put to a more practical use for recording numerical and alphabetical information.

Original "writing" on tape is usually accomplished by typing the data to be recorded on a special key-pulsing machine which uses a keyboard somewhat similar to a regular typewriter. The characters are recorded in coded form by means of electrical impulses which magnetize spots on the tape. Although the recorded data are not visible, electronic processing equipment can read the magnetized spots and control the performance of a series of operations with the data. The result can then be automatically translated into standard characters and printed on a bill or statement.

Another medium for recording data which is not so well known is the magnetic drum. This operates on the same principle as the magnetic tape and differs only in that the recording area is placed around the outside of a cylinder which is mounted on a shaft.

Still other electronic storage media are available—such as electrostatic storage tubes, transistors, ferro-electric storage devices, magnetic core devices, and perhaps many more which are over the horizon.

Data recorded on these or similar devices are in a form which can be automatically handled by electronic processing equipment. How might they be used in the telephone system? With AMA, the details of customer-dialed intercity messages are automatically recorded in coded form on paper tape by perforators operated by electrical impulses. They could be recorded on magnetic tape. Likewise, drum recording might be a possible substitute for the present message registers. A magnetic tape record could be taken from the teletypewriter equipment used for service order reporting.

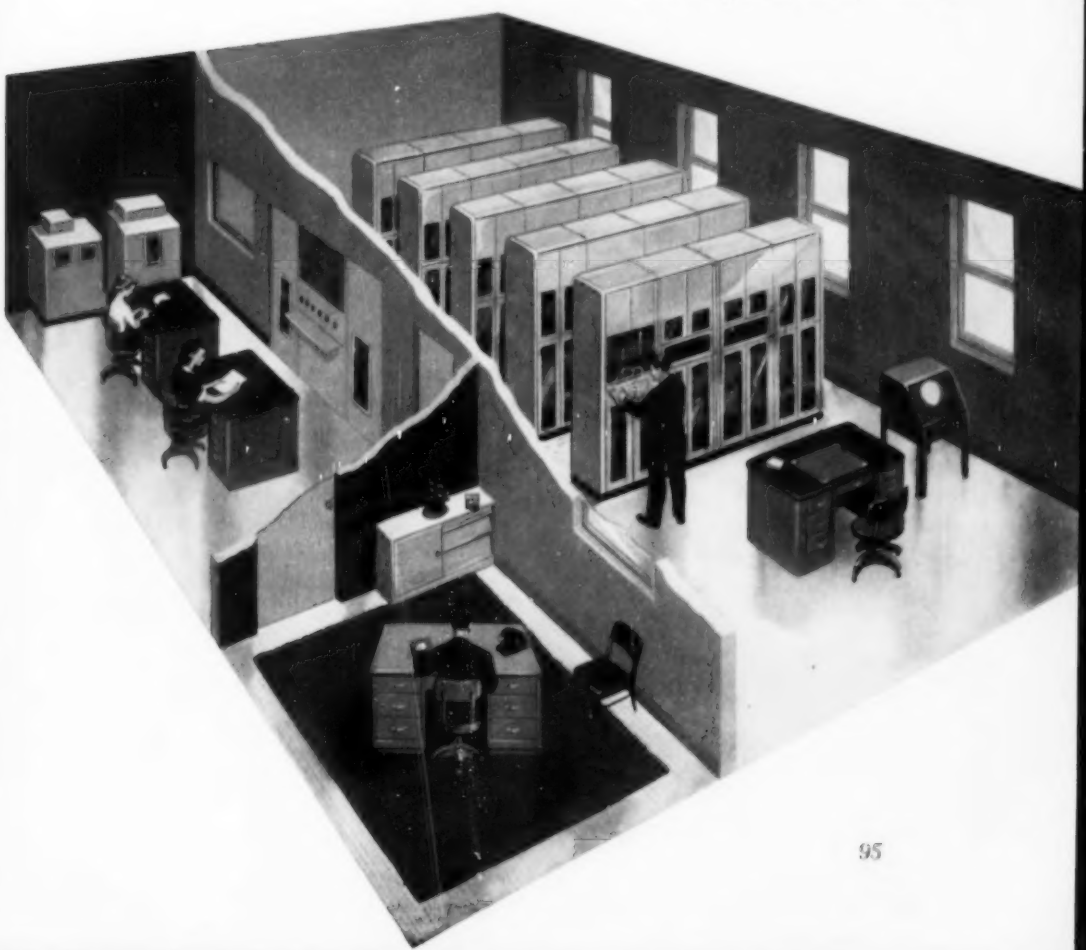
A photo-electrical scanning device has been demonstrated which has the ability to read printed characters. This equipment might well be used to automatically transfer data from cash payment stubs to magnetic tape.

A completely satisfactory procedure for automatically transferring data which are

handwritten to a recording and storage medium suitable for use with electronic equipment has not yet been found; but the IBM mark-sensing method at least offers a feasible plan for handling much of the data which cannot be recorded at the source by means of electrical impulses. The mark-sensing method involves the use of specially designed card forms with preprinted letters, digits, or codes representing the data to be recorded. A penciled line is drawn across the proper printed character or characters as required by the transaction involved. The cards are run through an IBM machine which electronically senses the presence of the graphite pencil marks and punches a corresponding coded hole in the card. The data can then be transferred by machine to magnetic tape.

The use of magnetic devices will permit the storing of tremendous numbers of records in a remarkably small space. For example, the details of 100,000 L.D. messages can be recorded on a reel of magnetic tape about the size of a dinner plate. A similar number of messages recorded on the present paper tickets would require a file

The telephone accounting office of the future —as an imaginative artist foresees it.



some 40 feet long, while punched cards would occupy a file 55 feet long.

Despite the tremendous possibilities of electronic processing equipment, it can perform no operation until it receives instructions as to what should be done. Therefore, each operation to be performed must be completely analyzed for the steps required. These instructions or "programs" could be stored in the equipment in electro-mechanical or electronic devices and would comprise the "brains" of the system.

Much of the accounting work is concerned with sorting data into telephone number order. Once the data are recorded in the language of the electronic equipment, the sorting can be performed automatically under the direction of the program for the particular operation involved. In terms of relative speeds, the sorting of 100,000 intercity messages can be accomplished in a fraction of the 100 hours required under the present method.

In an electronic system such addition, subtraction, multiplication, and division operations as are required would be performed by an automatic arithmetic unit. Magnetic drums containing basic tariff charges, tax rates, payroll tax deduction data, and other information, could form the reference part of the unit. Thus, when basic data were fed into the machine from the tape, the factors required for the particular computation would become available as needed to meet the requirements of the particular problem to be solved.

In our business, we not only have to store and process tremendous numbers of individual records, but also to print the final results on millions of customers' bills and pay checks—month after month. Commercial line-at-a-time printers, which work from magnetic tapes, have speeds of around 9,000 lines per hour. This, of course, is a vast improvement over a typewriter printing one character at a time, but it still falls far short of the speeds with which data can be read out of electronic equipment. Development work in this field may soon result, it is believed, in commercial printing equipment much faster than anything now available.

The Needs of All Departments

MUCH NEEDS TO BE DONE before a prototype accounting office of the future becomes a reality. The work involved must be done by skilled system and electronic engineers working closely with accounting people to insure that, once an electronic accounting system is designed and built, it will meet the requirements of the present and of the future. If the Accounting Department is to be equipped with electronic high speed processing equipment, consideration should, of course, be given to its use for meeting the data processing needs of all departments.

As is the way with revolutions, many situations will arise which must be resolved as we go forward. It is our belief that technological advances in electronics offer a solution to the problems inherent in record-keeping, and that the Accounting Department can look forward to being equipped with modern tools to cope with the growth of business which we believe lies ahead for the country and for the Bell System.

ANNUAL MEETING, 1954

THE ANNUAL MEETING of the American Telephone and Telegraph Company is held each year in April. It is a corporate action required by law, the purpose being to elect directors for the following year and until their successors are elected, and to vote on any resolutions set forth in the proxy statement.

The president conducts the meeting, comments on matters of special moment, perhaps gives his views on the outlook for the coming year, and replies to questions. Recent meetings have seen an increase in the number of share owners who attend in person—this year about 1,400 were made welcome—and in their participation in discussion.

Closed-circuit television this year and last brought to groups in adjacent rooms the proceedings in the assembly room, and this year it was also used to present to the meeting, on large screens, a half-hour "live" picture of many of the operations and activities of Long Lines telephone people.

To the share owners, the Annual Meeting affords an interesting review of the operations of their business. To the press it is usually news. And to the many A. T. & T. people involved, the meeting is the climax of weeks of preparation. The next ten pages show some of these people and the parts they played in this year's meeting.

S. Whitney Landon, A. T. & T. Secretary, and James A. Farmer, A. T. & T. General Attorney concerned with corporate and financial matters, confer about the preparation of proxy material for the 1954 Annual Meeting.

Proxies go out by mail to the share owners—more than a million and a quarter—of the A. T. & T. Co.

Left: Within a few days, proxies start to return to A. T. & T. in increasing numbers.

Below: The envelopes are opened swiftly by deft machines.

Each returned proxy is carefully examined to see that it is filled out correctly, and to make note of any special comment or instructions.

Proxies are sorted by machines, recorded, and a continuous tally is maintained.

Share owners' questions are answered and other matters are cleared up promptly by telephone and letter.

Inspectors of election pass upon the validity of proxies and certify the final count of votes.

The final tally: the total of all votes cast, to be reported at the Annual Meeting.

Share owners attending the meeting are asked to stop at the counters in the main lobby at 195 Broadway and obtain admission tickets.

Records temporarily set up in the lobby enable the attendants to verify share ownership quickly.

Attendants greet the share owners cordially, obtain their names, and fill out and hand them the cards which admit them to the meeting.

"Shots" from television cameras viewing various Long Lines activities were monitored in a control room temporarily established there.

Employees in the several Long Lines departments rehearsed before the television cameras their descriptions of the parts they and their equipment play in providing service. On the day of the meeting, they were brought before the share owners on large screens over closed circuits between the Long Lines headquarters and the A. T. & T. building.

Make-up is important for appearance before the television camera.

Representatives of several Long Lines departments consider factors which will affect long distance service in the future.

Long Lines operators at a long distance switchboard. Professional experience and skill were called on for technical phases of television production.

Rehearsal: Before the meeting, A. T. & T. President Cleo F. Craig, on platform, and others try out the acoustics of the assembly room and the placing of the closed-circuit television cameras which bring the activities there to share owners in adjacent rooms.

Control of the television screen in the assembly room below is serious business.

Chairs make an orderly pattern before the meeting.

The secretary makes formal announcements at the beginning of the meeting. Mr. Craig is seated beside him.

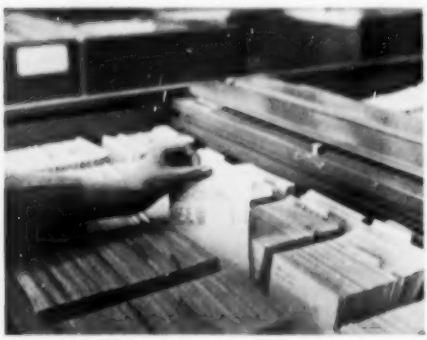
Share owners are attentive as the business of the meeting is transacted.

The press is well represented.

Vice President Killingsworth, head of Long Lines, demonstrates the speed of customer long distance dialing on a call to San Francisco.

Balcony seats afford share owners a clear perspective as their attention centers on the proceedings on the main floor.

Shares voted at the meeting are checked against the proxies which have been received by mail and with the stock records.



President Craig greets and converses with share owners after the meeting.

A share owner continues the discussion of a point of interest with Mr. Craig.

Day's end.

Every day is moving day for America's telephones—which presents to American's telephone companies problems of increasing complexity in this post-war era

TEAMWORK IS ESSENTIAL TO THE INSTALLATION JOB

BLAINE HOOVER, JR.

Exchange Service Engineer, O. & E. DEPARTMENT, A. T. & T. CO.

THE JONES FAMILY is moving and, as in most families, Mr. and Mrs. Jones have a multitude of things to do: get hold of a mover, pack their belongings, and—oh, yes—call the telephone office.

Giving the Joneses service in their new home, like installing the multi-line key telephone equipment for the new auto dealer or the single-party line for the high school set's dating calls, is an obligation that must be met. It is requirements such as these that keep telephones changing their numbers, their locations, their users every day. In fact, each year, on the average, two out of every five telephones in service will be affected by these customer demands.

Meeting the many needs of customers in the post-war period has made the telephone companies' installation job a larger part of their business. These demands have been met not only by an expansion of the plant but also by a more effective utilization of that plant. In addition, there has been an increase in the volume and types of complex services requested. Meeting these has resulted in a more difficult service problem—which involves also a greater investment and greater operating cost.

If we follow the Jones' moving problem as a typical installation job, we will soon realize that there are few operations in this business which require more team play between departments, right from Mrs. Jones' original call to the business office to the listing of their new number in the directory. Many telephone people make up the team. In this instance it begins with Mary, the service representative, who handles Mrs. Jones' request and initiates the issuance of a service order for Jim or Susie, in the plant assignment office. He or she processes the order so that John, in the central office, and Pete, in the installation truck, may complete the work. When it is ready for service, Betty will be at the OK desk in the plant service center to take Pete's report and notify the other girls in the traffic, directory, accounting, and commercial offices of that fact.

Mrs. Jones enjoyed calling the business office; "The girl was so considerate and

A service representative handles a customer's request for telephone service.

friendly" she told Dad that night. "She was very patient about explaining the rates we will have in the suburbs, and she let me choose the date so that we will not be without service during the move." Of course Mary had noted all of these items and many others on her contact memorandum. For it is from this memorandum that the service order is originated to notify all operating groups and to inform them of the work to be done.

By messenger, pneumatic tube, or teletype, the Jones' order travels to the Plant assigners. When the order arrives in the assignment office there are many things to be done—for this is the hub of the plant operation. Here the assigners must plan the web of wire and relays which will carry the service to the Jones' new home, and here they regulate the work load so that installers will be available to make the connection.

The Plant Engineering and Construction members of the team have designed and constructed the cable and wire lines out into the Jones' new subdivision. Were cable not available, the assigners would have to devise alternative arrangements or routes to keep this request for service from becoming an unfilled order. This requires careful consideration—which is why the foreman makes a check of each order held,

and often arranges for a field visit, before referring it to the engineers. It explains why they also check the essential records by which the assignments are made of the cable pair in the distribution terminal on the pole at the back of the house, at the cross-connection terminal in the big box down at the corner, and on the main frame connections in the central office.

The central office equipment in the new telephone building which will serve the Jones family has been designed by the equipment engineers and made and installed by the Western Electric Company —the manufacturing and supply branch of the Bell System. The switching equipment and telephone numbers are carefully and continually studied by the Traffic assignment people to maintain balanced use of this equipment in order to give good service to as many telephone users as possible. From one of the Traffic lists of available equipment, the Jones' telephone line and number are selected. Again team play is tested for, without lines in the right central office, the Jones' would become another order held for central-office equipment.

The Plant assigner has now reserved the cable pair, the switching equipment, and the telephone number, and Plant is ready to start the action—as well as to give advance notification to the directory clerks and the Traffic intercept people about the new telephone Mrs. Jones called for.

She called in the morning and by afternoon the central office people are arranging for the wiring work which will connect the facilities reserved for their new location. This is where John enters the picture.

John has been "on the frames" for a year now, and has become skillful in wiring the necessary connections between the central office equipment and the main frame terminations of the outside cable. He is an

The service order is sped to other departments by teletypewriter.

important link in the Jones' new telephone service. A slip on his part could cause all sorts of errors. Since the order to establish their service is due tomorrow morning, John will place all the wire this afternoon to insure against delays.

Pete, the installer, asked for outside work when he returned from the wars. He has been assigned a truck which he keeps as shipshape as the PT boat on which he served. In the morning his foreman had handed him his day's assignment. Plenty to do, he thought, but the boss knew it because the work load had been carefully planned for the number of men available that day. Another thing Pete had heard was that it took stockholders'

dollars to pay for these new installations, and since he, like most of the fellows, was buying A. T. & T. stock, it seemed important that they be done efficiently to insure his getting a good buy.

By that time he had reached his truck and loaded his equipment. His "due dates" were on the top, including the Jones' order. After caring for an "inside move" down the street, he saw the moving van at the Jones' new place and knew they had arrived.

Telephone, directory, and tools in hand, he met Mrs. Jones at the door. This was another reason he liked the job: he liked people. And most people were very appreciative of the service and consideration he tried to give. Mrs. Jones was impressed by his friendliness and his business-like manner and his knowledge of her requirements. After they had discussed the telephone location, she and her young son watched him for a few moments, then she once again turned her attention to the details of moving.

Pete had worked in this type of house before, and soon he had planned the job and was up on the pole checking the cable facilities and telephone number through the Traffic verification operator. Everything checked out OK. He needed that kind of team play if he was going to finish all his service orders in time.

Pete was thinking of what George, his foreman, had pointed out to him the day before while visiting with him on a job: that the progress made in improving methods, materials, and tools from year to year now made it possible for Pete to do parts of his job with less effort and in less time than the same job would have taken George in the days when he started with the Company. Pete hadn't realized, either, that the average tool-using employee is equipped with over $400 worth of tools in addition to his truck.

Pete is a careful workman; he has found that it goes best that way. That's why he uses the proper tool for each job, always

In the Plant assignment office, cable facilities are assigned on the service order.

Cross connection at the main frame brings central office equipment and outside cable termination together.

wears his goggles when there is the possibility of injury to his eyes, and keeps a good flashlight for use in basements, attics, and other dark spaces in which he has to work.

He usually has an audience to play to, and today it is Mrs. Jones' young son. Running the inside wire through the basement to the connecting block brings Junior downstairs and now Pete's job includes answering the "whys?" of a future installer.

A check of the set's connections and his regular dial tests assure him that everything is OK. Mrs. Jones returns when he tests the bells so that he may regulate their loudness. Pete also takes time to instruct her on how to dial—for this is her first dial telephone. It would be nice, she thought, if her husband could be as careful as Pete about cleaning up after his work.

The "OK Desk" is right on the beam this morning as Betty answers Pete's call. She has a copy of his order at hand, and in a minute she has the information required to notify all departments that the Jones' telephone is in and that billing should begin with the message register readings that John gave her.

The Traffic people must now post their records so that calls to the Jones' former number will be referred to the new; directory changes are made final for the next directory release; the commercial representative brings her records up to date

for future contacts with the Jones family; the Plant maintenance people establish a new record to facilitate trouble handling; and the revenue accounting people are responsible for the new billing charges and change of address.

Last, but not least, the accounting girls post to the books how many stockholders' dollars have to be paid out for materials as well as for Pete's check and other plant payroll checks.

The Jones' order is typical of the major part of our installation job. Its routine nature tends to hide the team efficiency required to meet this increasingly difficult service job. When all members are fully doing their part, our customers' requirements are cared for at a cost they can afford.

Before installing a new telephone, the installer verifies the service order with the customer.

Emergency Installation

DO YOU THINK ALL of the installation job is routine? In some respects, perhaps, but there are exciting times too!

About a year ago it was thought that the Missouri River was going to flood out Council Bluffs, Iowa. The only thing preventing it was an overloaded levee on the river, which needed a constant watch for signs of weakness. Northwestern Bell installers had the job of putting in sure-fire telephone installations at every critical point on the levee. And they did a record job of it, too.

A year ago the installation and repair team was on the go for a continuous 24 hours getting service into hurricane-blasted Cleveland, O., and Worcester, Mass. In such circumstances, it takes time for the service orders to catch up and the paper work to be completed, but otherwise the team-work was the same as on the everyday job. The Plant installers have earned their place on the restoration team and for that reason have an important place in Civil Defense planning.

Mobile Telephone Installations

THE EXPANDED USE of mobile radio telephone equipment in the post-war period has presented our installation team with one of its complex jobs. An example of a mobile customer might be the neighborhood doctor who has found that a mobile telephone in his car is an important service for use in his profession. For various reasons, the doctor changes cars every year—making him typical of our "mobile customer"; for, on the average, every mobile radio telephone set is newly installed each year. Most of the installation procedures are the same—except that radio channels instead of cable pairs are assigned. The installer, however, has many new problems: multi-conductor cables, power leads, and a radio transmitter and

The "OK desk" receives installers' reports of installations completed.

receiver requiring detailed adjustments. An appointment at the garage, a well planned job, and the proper tools have the doctor back on the air and in touch with any of his patients within a couple of hours.

Business Customers

OUR BUSINESS CUSTOMERS' requirements probably bring about the most complex of our installation jobs. These range from the intercommunicating arrangements for small businesses to private branch exchanges big enough to care for a fair-sized town.

These customers have the "move and change" habit, too, contributing their share to the over-all average of two out of five telephones that require installation changes during a year.

Because of the complexity of most of these installations, service engineers are called in to design and plan them. Their design work, the result of special training, can provide not only the best service for the customer but also the most economical and stable installation.

After negotiations are complete, the service engineer releases information to the business office in order that the service order may be issued.

Not only has negotiation with the customer necessitated special care and attention, but the part played by the supply team, who furnished Mrs. Jones' telephone and the doctor's mobile radio, now becomes more important because of the larger quantities and special types of equipment required.

Now the supply forces are notified about the requirements of any parts not normally carried in their stocks. Special requisitions for these parts are placed on Western Electric in time to permit their delivery to coincide with that of the other items. Most

of these deliveries are made directly to the customer's new location or to lockers in which the installer keeps his tools.

The installation forces must plan the equipment arrangement of most business customers' service in greater detail, for probably inside wiring cables have replaced wires; cable terminals have replaced the simpler connecting blocks; switchboards and key sets, with buttons to afford access to several lines, have replaced the ordinary telephone. Special arrangements must also be made to provide the power to operate all of this apparatus, since the power that operates the individual telephone is not adequate to meet the new requirements.

Key telephone sets have introduced the most widespread use of complex station installations. In some business areas as many as one out of every five telephones is of this type. In addition to the many more conductors required to serve these telephones, there are perhaps three or more relays per line to be installed and adjusted. Another service feature, dial intercommunication, has also introduced selectors on the premises. The local switching requirements of these key telephone plans have, of course, increased manyfold the effort involved in each installation.

The installers of a private branch exchange, the switchboard that serves so many business houses, hotels, and other

Installation of mobile telephones differs from that of telephones which stay put.

establishments, must not only install telephones but most of the other equipment associated with what is the equivalent of a complete central office building.

Weeks, even months, are required for some of these installations. Business customers cannot afford a moment's loss to their service. Time is on a budget on these jobs, and quite often the week-end is the PBX installer's busiest time. This is both installation and cutover time for some customers.

One Saturday in New York, for instance, Wall Street passersby were surprised to see a new eight-position PBX switchboard hanging over the middle of the street. A survey of the job of relocating a bank's switchboard had revealed that it could not be moved without undue interruption to the service. Studies had also shown that an addition to the board was needed to handle the increased number of calls now being made.

Authorization of a new switchboard by telephone company equipment engineers permitted the relocation job to be carried out with a minimum of interruption to the service. The actual installation effort was further minimized by having the new board assembled in the Western Electric Company distributing-house shop, then delivered to the job, where riggers with a 75-foot boom hoisted this 5-ton piece of equipment to the new third-floor location through a window that allowed only inches to spare.

On a subsequent Saturday the installers, after completing the installation, cut the new board into service.

Not all of our business installations are in metropolitan areas. Those associated with pipe line pumping stations, for

An emergency telephone installation on a levee threatened by flood waters.

example, are usually in rural locations and have complex multi-party lines with equipment provided to allow any one station to signal selectively any other station. The problems posed by distance require even greater attention by installation people to the design of the service, the supplying of material, and the training of the installer.

Installers must be resourceful, for wherever customers go they request telephone service. A mine shaft, where explosion-proof equipment is used, or the emergency outdoor telephone set along the turnpike, all challenge the installer in his job of completing that final important link.

THIS, THEN, is the installation story. Since its beginning, in the days when all installations featured a telephone with a crank on the side, each year has brought new equipment and more variations of older equipment.

As the number of features and services rendered has increased, so have the demand for service and the volume of changes increased. Each new demand for service and each request for a change must be met. No wonder the average telephone is connected, changed, or moved every thirty months.

All this takes an increasing share of the price the customer pays for service and of the share owners' dollars. It becomes increasingly important to our business, therefore, that the problems of installation continue to receive the interested support of all team members. The result of this working together will be greater effectiveness in every operation—which also will permit the clearing of our today's back-logs *today*, so that we may serve our customers upon demand now and in the future.

An eight-position private branch switchboard weighing five tons is hoisted to the third floor of a bank for installation.

The aggressive program for selling long distance message service in Michigan, here described, is representative of the programs developed throughout the Bell System

SELLING LONG DISTANCE IN AN OPERATING COMPANY

BERNARD C. BLEISCH

Sales and Service Manager, MICHIGAN BELL TELEPHONE COMPANY

NOTE: *In the Spring issue of this Magazine, "Now It Can Be Sold," by Justin J. Murphy, Sales and Servicing Engineer of the A. T. & T. Co., reviewed the broad objectives of the Bell System's sales program—including the sale of long distance service. A description of the operation of the sales program in an Associated Company seems timely now, and we invited Mr. Bleisch to contribute this account of how his company promotes the sale of long distance message service.* EDITOR

NOW LONG DISTANCE SERVICE can be sold—and we're selling it!

For the first time since the late 1930's, we have sufficient facilities to sell the use of long distance telephone service. This situation, apparent in the latter part of 1953, resulted from a general readjustment in business activity together with the fact that the System's long distance facilities have been tremendously expanded in postwar years to keep pace with demand.

The receding general business curve means our customers are also selling. This fact, coupled with the long period during and since World War II in which we were not in a position to stimulate long distance usage, finds us with a ready market for our service. Business today is anxious for ideas which will result in a more economical operation or in increased sales, and through the sound application of long distance service to the customer's business we can make these aims a reality. We ourselves are vitally interested in maintaining and increasing long distance message revenues—which provide approximately one-third of all System revenues.

In Michigan we believe that increased use of long distance service can be best accomplished through a sales and advertising program backed up by the cooperation, interest, and enthusiasm of all departments and employees. Therefore, an interdepartmental committee comprised of vice presidents and department heads was organized to:

acquaint the various departments with the need to stimulate usage,

develop new ideas, and
check on the progress of the program.

With complete backing of top management, and through the efforts of all departments, considerable progress has been made in a relatively short period of time.

Employees are being kept informed of the activity through the company magazine, posters on bulletin boards, pocket-size cards containing basic information, and other printed material, and through informational meetings.

The Public Relations Department has prepared a comprehensive program of local advertising to tie in with the national advertising program. This program includes newspaper advertising in both weekly and daily papers, advertisements for trade papers and local magazines, spot announcements and program coverage for radio and television, posters to appear in our public offices, booth cards to be installed at coin telephone locations, exhibits for fairs and shows, and inserts to be included with customer bills. Every appropriate means of carrying our story to telephone users is being explored—and every effective approach utilized.

The Directory Department is including filler ads in the Yellow Pages designed to stimulate the use of long distance service. Long distance rates are again being featured as new directories are printed. Instructions on how to place long distance calls are prominently displayed.

The Traffic Department is conducting extensive educational programs so that their people are aware of the promotional efforts of other departments. Their people talk with customers about long distance service when discussing such items as dialing irregularities, number changes, or dial cutovers.

The Plant Department is encouraging installers and repairmen to discuss long distance service on their regular customer visits. In addition, they are distributing among residence customers a pamphlet containing information on types of calls, rates, and suggestions for various uses of long distance service.

The Commercial Department, along with the Public Relations Department, has the major role in carrying our story to customers and "selling" them on the advantages of long distance service.

In the business office a "Talk Toll" plan has been introduced, and service representatives are trained to be alert for opportunities to talk about long distance service in their 15,000 daily customer contacts. For example, the service representative will point out where appropriate, in contacts when long distance service is discussed, that reduced rates are in effect after 6 P.M. and all day Sundays; station rates are less than person rates; calling by number is faster; a booklet in which to list out of town numbers is available upon request.

We are carrying our story to members of business clubs, trade associations, and other groups. This is done through talks, demonstrations, and film showings designed to highlight long distance telephone service.

Our business and residence customers each contribute about half of our long distance revenues. From a cost standpoint, it is not possible to reach personally all of these customers. Careful market selection, therefore, is necessary.

Sales to Business Customers

SINCE PRE-WAR EXPERIENCE and recent tests indicate that business customers offer the

greatest sales potential for increased usage, particularly those now using substantial amounts of long distance, we are selecting business customers for initial coverage on that basis. Those to be contacted include customers who:

use fifty dollars' worth (or more, excluding taxes) of long distance service a month

have teletypewriter exchange service or intercity private line services

are part of a multi-office operation, such as those having factories, sales offices, branches, or warehouses in several cities.

Contacts with these more promising prospects is the responsibility of a specially trained group of salesmen.

Selling long distance service to business customers is not like selling automobiles, industrial equipment, or household appliances. It is not the same as selling key telephones, key cabinets, or switchboards. Long distance usage has a more intangible quality, and telephone calls are a perishable item. To sell long distance service requires specialized sales treatment by well-trained, competent, and enthusiastic salesmen.

Nearly 400 Profitable Uses

THE LONG DISTANCE SALES PLAN our salesmen use was developed by studying how different business and industrial concerns were using long distance service and what benefits they were getting from it. As a result of those reviews, the System accumulated valuable information about the operation of a great many types of businesses and their use of long distance service. Nearly 400 individual uses of long distance service that have proven profitable in business operation have been catalogued. Our plan is to show other customers how they, too, can benefit by adopting these usages in their operations.

Work with customers whose business operations cover several states involves not only our salesmen but the coordinating efforts of the Long Lines Department of A. T. & T. and the assistance of salesmen from the Associated Companies in whose territories our customers operate.

The success we have experienced in helping customers to save money and increase sales through the use of long distance is illustrated by some of our recent cases. They range from the largest manufacturing companies to small retail merchants.

Here are a few highlights from recent sales.

Steel companies have been among the most receptive customers in adopting our suggestions for effective planned usage of long distance service. For example:

¶ *The Keytown and Skipstop Plans:* Using the keytown plan, the salesman calls his customers in the area surrounding a town in which he has established temporary headquarters. The skipstop plan affords wider market coverage and more frequent visits with customers through the alternate use of personal and telephone visits. The steel company's salesman so organizes his route that on one trip he visits one group of customers personally while reaching a second group by long distance from nearby towns. On his next trip he reverses the procedure.

¶ *Enterprise (Special Reversed Charge) Service.* In the interest of extending their market coverage to towns surrounding their sales office and warehouse locations, a number of steel companies have initiated the use of this service. Enterprise service provides them with representation in the telephone directories of the selected cities

and extends free calling privileges to their customers.

¶ *Following-Up Customer Initiated Orders.* To assure maximum sales to customers ordering by mail, several steel companies are calling by long distance all customers who place such orders, to thank them for their business, suggest additional items, increase orders to standard lots.

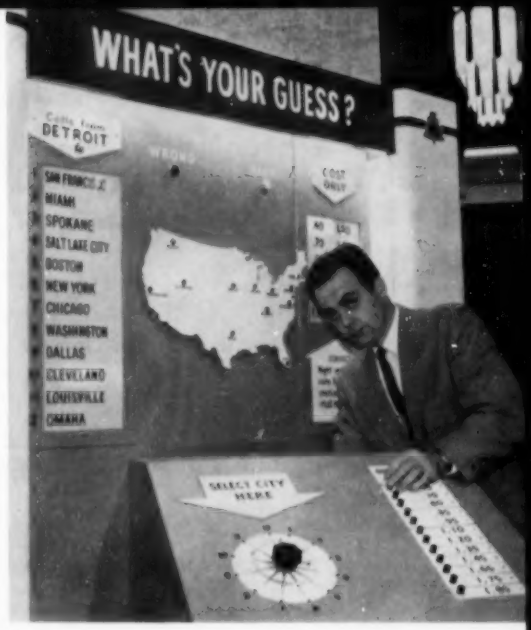
Other usages adopted include collect call plans, thanking new customers for their business, and checking credit limitations with the home office. All these usages add up to increased sales through extended market coverage and more thorough servicing and sales coverage of existing customers.

¶ The officers of a national wholesale trade association were so impressed with results from the recent use of sequence calling lists by some of their Michigan members that they have provided space in their magazine without charge for a description of this service to their more than 10,000 members.

¶ A popular dancing school is combating the problem of establishing costly suburban branches by using "Enterprise" service in nearby towns. An extensive radio and newspaper campaign, advertising their business, encourages prospective clients to call, without charge, the Enterprise number in their area to arrange an appointment or obtain information.

¶ A bank president has agreed that his Foreign Banking Department can increase their business and offer a personal executive touch by supplementing mail and cablegram messages with overseas telephone calls to England and France.

¶ A customer operating a large truck fleet, and planning to expand into a new market area, was sold on accepting collect



This display, for use at public gatherings, emphasizes how much customers are likely to overestimate the cost of long distance calls.

calls from that area from any of his customers concerning:

additions to or deletions from delivery orders,
changes in shipping schedules,
claims for damages,
miscellaneous servicing calls.

To help advertise this plan and to solicit new business, "stickers" indicating a willingness to accept collect calls are being attached to mailing pieces. In addition, an attractive poster showing a man talking over the telephone and a line of type saying, "Don't delay, phone today. We'll pay the charges" is being distributed to their existing and potential customers.

¶ A well-known real estate broker specializing in purchases and sales of large office buildings has increased his use of long distance service in conducting negotiations in which split-second timing may involve millions of dollars. He also anticipates using long distance conference serv-

ice to consult with the directors in his company who live in several different cities.

¶ One of the major meat packers was planning on introducing prepared "pork and veal chopettes" to their retail outlets. As first planned, these attractive frozen packages were to be announced by means of post cards with a tear-off section to be filled out and returned as an order. The customer was convinced of the advantage of sending out the announcement with an invitation to call collect for packaging and price information. By opening their telephone door in this manner, the company afforded their salesmen the opportunity to increase the variety and size of orders. In addition, store displays advertising these new products could be recommended and made available to the retail stores as appropriate.

A sales poster in the making. Such promotion pieces remind employees that every customer contact offers a chance to "sell long distance."

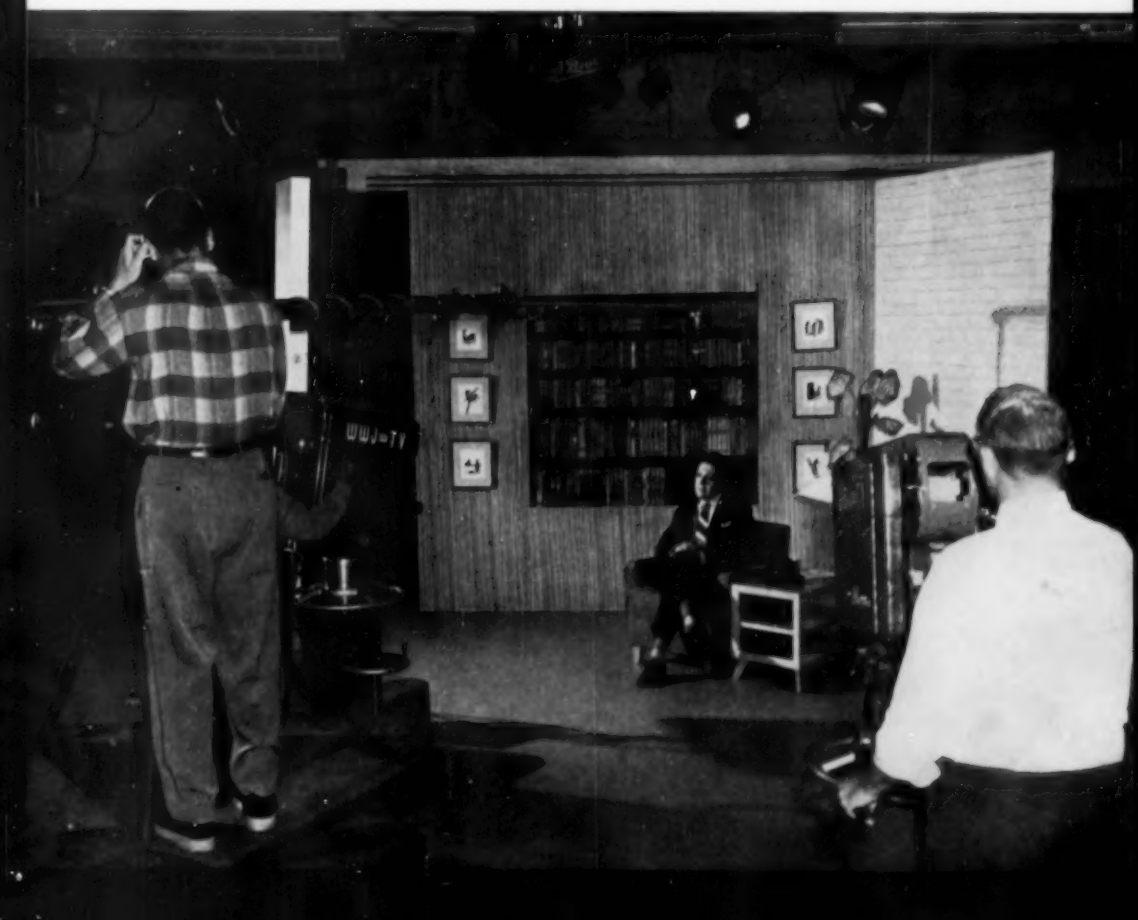
¶ A national oil company is utilizing systematic long distance conference service to get in touch with all division offices on a regional basis to discuss price changes, current results, and general policy matters. This usage will be a time saving substitute for mail and field trips, as well as adding the personal stimulation of a direct word from the home office.

¶ A jewelry manufacturer adopted a plan of collecting overdue bills by long distance telephone after a two-day trial netted him highly profitable results.

These cases and hundreds of others indicate the salability of long distance service, and we believe we have the formula for turning sales opportunities into sales success. Our answer to effective selling of long distance service is company-wide cooperation.

The Public Relations man creates advertisements which are appealing, informative, and action-stimulating to our customers. The service representative is alert to opportunities to "talk" long distance usage on her numerous customer contacts. The Plant man provides and maintains the necessary equipment and service, and "talks" long distance on his many contact opportunities. The Traffic operator continues to give the fast, top quality service which causes customers to buy again.

Television "commercials" on Michigan stations remind people of the convenience and satisfaction to be found in long distance calls.

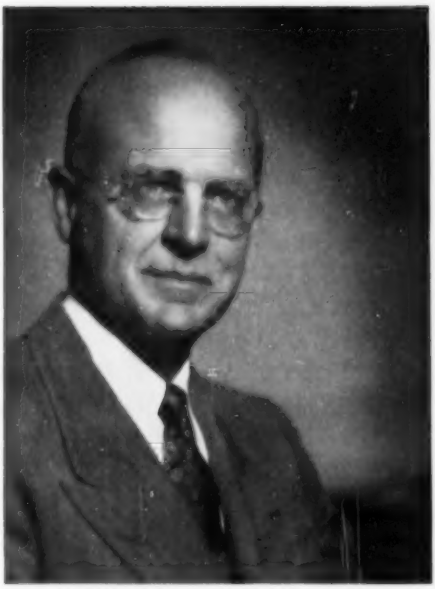


Sales interviews such as this, between a Detroit banker and a Michigan Bell salesman, emphasize the business economics of overseas telephone calls.

The salesman, armed with the best product of its kind in the world, supported by all departments and all employees, knows that long distance service can be sold to our business customers and that he can sell it—and he does!

Who's Who & What's What

IN THIS ISSUE



Executive V.P.: Hal S. Dumas

COURTESY is a genuine quality in all telephone people nowadays. There is a tradition, however, that courtesy is particularly ingrained among people of the South, and it is for that reason, as well as because he is executive vice president of the A. T. & T. Co., that we asked HAL S. DUMAS to contribute this issue's "guest editorial" on the place and importance of courtesy in the telephone business. Born in Georgia, Mr. Dumas devoted 40 years of his life to the Southern Bell Telephone and Telegraph Company—eight of those years as its president. He started in Atlanta as a trouble man, moved to greater and greater responsibilities through the Traffic, Plant, and Executive Departments, and reached the top in 1943. Then the scene changed radically with his election to his present post in 1951. As executive vice president he assists the president in the general administration of the business, and acts for him in his absence. Said this MAGAZINE of Mr. Dumas two years ago, "System executives who seek his counsel find it flavored with ripe judgment."

WHEN EUGENE J. MCNEELY contributed an introduction to an article "Benefits and

O. & E. Head: Eugene J. McNeely

Assistant Chief Engineer: Charles M. Mapes

Pensions Have Proved Value for 40 Years," which appeared in this MAGAZINE just a year ago, he was A. T. & T. Vice President in charge of the Personnel Relations Department. It is as Vice President in charge of the Department of Operation and Engineering since January 1 of this year that he contributes the introduction to this issue's "Emergency Mobilization and the Bell Telephone System." Starting as a student engineer with the Southwestern Bell Telephone Company, he held various craft and engineering jobs leading through posts of increasing responsibility to that of district plant superintendent in 1932, division plant superintendent in 1935, and general plant personnel supervisor in 1941. He became Area plant superintendent in 1944, and general plant manager of the company in 1947. The following year he moved to New York as an assistant vice president in the A. T. & T. Personnel Relations Department. In January 1949 he was elected Vice President (Operations) of the Northwestern Bell Telephone Company, and in December of that year he was elected president of the company. In 1952 he received his Personnel appointment, in which he continued through 1953.

THE BELL SYSTEM career of CHARLES M. MAPES, which began in 1923 in the old Department of Development and Research of the A. T. & T. Co., led straight to the assembly room in Washington where, on June 9, he delivered an illustrated talk on the Bell System's defense capacities before a group of top-ranking officials who are concerned with the vital matter of defending this country. For all the intervening years have been spent in ever-broadening phases of plant and engineering work—including three years with the Bell Telephone Company of Pennsylvania in Pittsburgh as general plant supervisor—up to his logical appointment in 1951 as defense activities engineer. In this post he was made responsible for coördinating activi-

On the Defense Team: Cole A. Armstrong

ties within the O. and E. Department relating to the national defense. This was followed in July of 1952 by promotion to his present post of A. T. & T. assistant chief engineer.

Succeeding Mr. Mapes as defense activities engineer was Cole A. Armstrong. And although the latter no longer bears that title, he was active in preparation of the material from which Mr. Mapes spoke, and accompanied him to Washington. His telephone career began when he joined the New York Telephone Company as Traffic student in 1929. He was occupied with various Traffic responsibilities until he entered the Navy in 1942—from which he was released in 1945 with the rank of Commander. He then returned to the Traffic Department of the New York Company. Three years later he transferred to the Traffic section of A. T. & T.'s O. and E. Department, and in 1950 he became service protection engineer in the Defense Activities section. Since 1953 his title has been that of customer equipment engineer.

Installation Planner: Blaine Hoover, Jr.

Crystal Gazer: Fredric M. Biathrow

Fredric M. Biathrow joined the Accounting Department of the New York Telephone Company in 1929. There, staff and field assignments on revenue accounting work in that company's Long Island Area brought him experience in this branch of the accounting job. In 1946, he transferred to the Operations Division of the Comptroller's Department of the A. T. & T. Company, where he was engaged in developing methods for the sorting of toll and local message tickets. The results of these activities were recounted in the Autumn 1948 issue of this magazine in an article entitled, "Sorting Two-and-a-Half Billion Tickets a Year." Assignments as group supervisor for revenue accounting methods and later for office organization preceded his present position as head of the group handling fundamental developments in the field of mechanization. This group, in

addition to being responsible for AMA matters, has been concerned with developing a long-range plan for handling the Accounting Department's work which looks beyond the mechanization possible with mechanical equipment now available. His article in this issue describes the general nature of the program which is now getting under way.

BLAINE HOOVER, JR., STARTED his career with the Bell System in the Illinois Bell Telephone Company at Chicago as a splicer's helper in 1939. He filled various outside plant craft assignments until appointed assistant plant engineer in 1940. He entered the Army in 1941, served in the China Burma India theatre for two and one-half years as a Lieutenant Colonel, and was awarded a bronze star medal for his communications services. He returned to the Illinois Company as an engineer in the Plant Engineering Department, and shortly thereafter transferred to the Chief Engineer's organization. In 1948 he participated in the O. & E. Department's study of cable utilization. He returned to Illinois, and was appointed District Plant Engineer and, in 1950, District Plant Superintendent. Since his return to the O. & E. Department in 1951 he has held several assignments in the Plant Division in intercity and exchange maintenance and installation. In preparation of his article he had the help of the exchange service group, including Harlie L. Beagle, the chairman of the interdepartmental service order committee.

Sales Stimulater: Bernard C. Bleisch

THE RECENT LEVELING OFF of long distance messages and revenues has opened the door to a program of active stimulation of this service. As sales and service manager with the Michigan Bell Telephone Company, BERNARD C. BLEISCH has been instrumental in organizing and directing his company's current program of sales promotion of long distance service. Starting in the Plant Department in 1941, and serving three years in the Army Air Force, he was transferred to the Commercial Department in 1946. Since that time he has held a variety of sales line and staff assignments including sales supervisor, toll and teletype; sales supervisor, PBX; sales training supervisor; sales methods supervisor; and sales results supervisor.

HEADQUARTERS SUMMARY

March 15 to June 15, 1954

THE SECOND JOINT MEETING of Headquarters groups with the United States Independent Telephone Association's technical subcommittee on Operator and Customer Toll Dialing was held in April. Independent telephone operating and manufacturing people throughout the country submit their technical questions concerning nationwide dialing to the USITA subcommittee. This material, after consolidation by the subcommittee, forms the basis for the discussions. Some 70 items relating to the technical engineering and operating phases of nationwide dialing were discussed at the April meeting.

A SPECIAL STUDY is being made by the O. & E. Department and Bell Laboratories of certain elements of the station maintenance job which have a substantial bearing on service and expense. Currently the Companies are spending over $150,000,000 annually on the maintenance and shop repair of station equipment. This study will include a review of methods and costs involved in handling reports of trouble, and a review of adequacy of test equipment, tools, and field instructions.

Determination will be made in more specific detail than at present available of the underlying causes for equipment and apparatus troubles and whether it is possible to improve the inherent reliability of products through changes in design. A critical study will be made of the amount of repair work desirable on station apparatus returned to Distributing House shops in order to assure satisfactory performance when it is returned to the telephone companies.

FOR THE FIRST TIME since its inception in 1917, the general contract between the United States Coast Guard and each of the Bell companies involved has been amended. This contract, designed to insure the best possible service for the Coast Guard in connection with its administrative and emergency operations, covers both the furnishing of facilities and service and the interconnection of Coast Guard facilities along the coast and the telephone companies' network. For the past 37 years the contract has required the maintaining currently of detailed information showing the services and equipment furnished at each location, rates and charges applicable, and other related data. The amendment, effective July 1, 1954, eliminates this burdensome routine, and makes possible the introduction of simplified procedures for the handling of orders and billing for Coast Guard communication services. Substantial savings will result to both the Coast Guard and the companies.

KEEPING THE BELL SYSTEM'S centralized pool of liquid funds invested in U. S. short-term obligations has always been an important job for the Treasury people at A. T. & T. Headquarters. It has been an unusually active one in recent months, with the pool raised to nearly one billion dollars by the proceeds from the $600,000,000 A. T. & T. convertible debenture issue. It was necessary to get these new funds advantageously invested on a maturity schedule that would fit in with the estimated timing of Bell System needs. Handling the centralized pool for 1953 involved 2,200 separate transactions with Associated Companies and 600 separate transactions with government bond dealers. The average annual rate of return on temporary investments was 2.07 per cent for the year.

CONVERSIONS OF A. T. & T. debentures into stock exceeded $400,000,000 during the first half of 1954. It was the busiest six months of conversion activity in the financial history of the company. The new Convertible 3⅜s of 1965, which were issued last December and became convertible on February 9, accounted for more than 90 per cent of the debentures converted. The result has been to reduce the debt ratio of the Bell System to 38 per cent, the lowest level since inauguration of our post-war financing in 1946. Only $326,000,000 of the four existing A. T. & T. convertible issues remained outstanding at the end of June, representing less than 18 per cent of the original amounts issued. More than a third of the converting of these issues to date has been due to arbitrage transactions, that is, the concurrent buying of debentures and sale of stock on the market by professionals who convert the debentures and deliver the resulting stock to the purchasers.

A NEW TYPE of coaxial cable system, capable of transmitting more than 5,000 telephone conversations simultaneously, was opened for service between New York and Chicago, via Philadelphia and Cleveland, late in March. It took a year and $10,000,000 to convert the coaxial cable on this route—which handles the heaviest public and commercial communications traffic in the country—to the new-type facilities, known as L–3. One hundred twenty amplifying stations established at eight-mile intervals along the route had to be equipped and an additional 120 stations, placed half way between those already in operation, had to be constructed and equipped. With the L–3 coaxial system, it is possible to transmit more than 1,800 conversations simultaneously over a pair of coaxial tubes, or to carry 600 telephone conversations and two television programs—one in each direction—at the same time.

RECENT EXTENSIONS of long distance dialing include the cutover in June of a 4A toll crossbar system at Richmond, Va., and introduction in recent weeks of nation-wide dialing for customers in a suburb of Detroit—the second Detroit suburb to have this service—and in four suburbs of Washington, D. C. Richmond was the 28th city to have a toll crossbar system. Four more systems of this type will go into service this year. Some 3,000 cities and towns are now on the toll dialing network. Over half of the toll board calls are dialed through to completion by outward operators.

"Foreign area" customer dialing is now available to about 75,000 customers in eight localities. These customers can dial about 13,000,000 telephones in a number of metropolitan areas from coast to coast. During the last half of the year this service will be opened up for customers in 15 additional localities.

THE NUMBER OF television stations in the nation to receive service over the Bell System television network climbed to 300 in May when Station KWNY–TV, Kingston, N. Y., was added to these nationwide facilities. As of June 15, almost 200 cities in the United States were receiving television programs over the Bell System network. Some 55,000 channel miles of radio relay and coaxial cable circuits are now available to provide this network service. Six years ago in May, when network television was inaugurated commercially, there were fewer than 1,000 miles of television channels in operation.

A SOLAR BATTERY—the first successful device to convert useful amounts of the sun's energy directly and efficiently into electricity—was demonstrated at Bell Telephone Laboratories last April. Scientists there, with an amazingly simple-looking apparatus made of strips of silicon, showed how the sun's rays could be used to power the transmission of voices over telephone wires. The Bell solar battery also used energy from the sun to power a transistor radio transmitter carrying both speech and music.

Bell Laboratories reported that it was able to achieve a six per cent efficiency in converting sunlight directly into electricity. This compares favorably with the efficiency of steam and gasoline engines, in contrast with other photoelectric devices which have never been rated higher than one per cent. With improved techniques the Bell Laboratories scientists say they expect to increase this efficiency substantially. Nothing is consumed or destroyed in the energy conversion process and there are no moving parts, so the Bell solar battery should theoretically last indefinitely.

Although work is still in the laboratory stage, actual use of the solar battery in the telephone business is a strong possibility.

WESTERN ELECTRIC recently signed a new contract at the request of the Atomic Energy Commission to continue operation of the A.E.C.'s Sandia Laboratory at Albuquerque, New Mexico, until the end of 1958. Since 1949 the work of development, design, engineering, and prototype production of atomic weapons there has been under the direction of technical experts from Western Electric and the Bell Laboratories. This work is being handled for the government by the Bell System on a non-profit basis.

THE NUMBER OF FIRMS licensed by Western Electric to manufacture and sell transistors has now reached 43, including 28 domestic and 15 foreign companies. In addition, more than 500 firms are licensed by Western to produce and sell equipment containing circuits developed by the Bell Laboratories in which transistors may be used. Among the variety of products now on the market in which the transistor can be found are hearing aids, an electric eye counting device, a microphone with a built-in transistor pre-amplifier, and a sound pick-up for 16-mm. motion picture projectors.

The Blue Pencil

JUST ABOUT EVERY MAIL brings to the editor's desk some "telephone magazine," either of Bell System production or of some other telephone organization here or abroad. All are interesting—to one at this location, at any rate. A publication from "the other side" is the *Telecommunications Journal* of the Post Office of the United Kingdom—which, as you know, handles not only mail but the telegraph and telephone services in that country. In the May–June 1954 issue appears an article entitled "Service to Subscribers in the United States," based on a report published by the British Productivity Council, which presents an interesting viewpoint—not to say flavor. The opening statement that "Though the title of this article may appear to be general, the operative word is *Service*" is followed by descriptions of many American operating practices—not all of them accepted without reservation. Of broadest interest, perhaps, is the concluding paragraph, which bears the heading "The Meaning of Service":

"These aspects of the American telephone business reveal how the companies think of service as something personal rather than numerical or even standard. In this respect their outlook is the same as that throughout American business where the personal satisfaction of the customer is the paramount consideration. To get an idea of how the telephone subscriber judges the administration it may be useful to work out how you judge 'service' at a retail shop. The shop you select as giving the best service is not necessarily the cheapest or the one with the largest range of goods. It is the one that welcomes you as an individual, that tries to avoid forcing on you what the shop assistant thinks you ought to have, whether you want it or not; it is the shop that may sometimes make mistakes in the goods or in giving change but repairs the error with such grace and sincere apology that your complaints are turned into appreciation. These things may not be revealed by statistics, but they do determine the answer to the question—'are you satisfied with the service or not?' There is a great deal behind the Bell System slogan—'*Service—that's what we Sell*'."

If those are British conclusions of American objectives, they seem like pretty sound ones.

ALMOST THE ENTIRE COMMUNITY of Nitro, W. Va., turned out last June 10 to witness a parade in honor of Mrs. Susie Toler and help observe "Susie Toler Day." She was the guest of honor at a banquet of 300 friends and associates, and was presented the symbolic "key to the city."

For June 10 was Mrs. Toler's birthday, and on that day she retired from the telephone industry after 51 years of service. More particularly, the last 25 years of that half-century-plus of service had been spent at the switchboard in Nitro, and the citizens of that community wanted to show their appreciation.

Mayor Alexander made it official with a proclamation which said, in part:

"WHEREAS, the people of Nitro realize that no one is more deserving of such honor than this woman who has served the community so well at the local telephone switchboard for these many years and whose retirement will, in a sense, mark the end of an era of personal telephone service; and—

"WHEREAS, it is only fitting that one who has met the needs of the public so long and so faithfully should be recognized by the people of the community she has served;

"THEREFORE, I, W. W. Alexander, Mayor of the City of Nitro, do hereby officially proclaim next Thursday, June 10 as "Susie Toler Day" and do earnestly urge each of our citizens to join in this tribute to a public-spirited citizen whose devotion has been displayed through long years of untiring service."

"W. W. ALEXANDER, *Mayor*"

Many another telephone operator may deserve such recognition—but few get it in just this way.

DISTRIBUTION of new telephone directories in cities is always the occasion for the preparation of "press releases" for daily newspapers, for the general and desirable information of the public about the event and how it proceeds. As the task rolls its repetitive round over the years, it becomes a bit of a chore within the Public Relations Departments of the Associated Companies, and efforts have been made now and again to give the "releases" a fresh touch. The copy writer at the New York Telephone Company who concluded his this Spring's assignment this way seems to have struck a new note:

"Distribution of each issue of the new Manhattan book, invariably bigger in circulation than the preceding one, causes the telephone company's slide-rulers and mathematicians to break out in their seasonal rash of easily-forgotten statistics. For instance, among other facts that don't really matter, it can be stated without fear of confirmation that the new Manhattan book contains 780,000 listings on 1,800 pages and uses up 4,000 tons of paper, 13,000 gallons of ink and 5,000 gallons of glue; and that last figure is one the statisticians are always stuck with. A veteran telephone mathematician was responsible for the incontrovertible statistical conclusions that if all the Manhattan telephone books were piled one above the other they probably would topple over, plus the irrefutable finding that if they were all placed end-to-end it would be a ridiculous waste of labor.

"Donnelley Corp's 600 carriers are expected to walk a total of several miles and climb goodness knows how many stairs (this is one that all the statisticians flunked) on their Manhattan directory delivery. It is estimated this huge task will take 12 days. The carriers have identification cards which they will show on request to those telephone customers who are justifiably suspicious of strangers who want to trade them new books for old ones."

SURE-FIRE ILLUSTRATIONS, according to an advertising axiom, are pretty girls, babies, and animals—in that order. Whether the second category includes advertisements *by* children we don't know. But last April's A. T. & T. advertisement in national magazines, reproducing comments written by grade-school children on the value of the telephone, apparently rang the bell—or several of them. One trade journal in the advertising field devoted a page to a reproduction of the ad, and commented—"a breath of fresh air," adding that "Today, when all advertising is so professional . . . it is heartening to see copy of this sort." And a newspaper columnist in British Columbia described it as "everything that advertising should be: truthful, effective, eye-catching, and extremely well written." Yet it originated simply as a by-product of the Bell System's efforts to fulfill its obligation to teach the upcoming generations how to use effectively a tool of modern living. Such comments make pleasant reading, though—even on the sidelines where we sit.

THE COVER of this issue, with its Traffic theme, is reproduced from an original etching done for this magazine by Federico Castellon. To illustrate the continued importance of the operator in a world of increasing mechanization, Mr. Castellon chose a D.S.A. (dial system "A") switchboard in New York City for his setting, and shows operators and a service assistant as he found them there. Born in Almeria, Spain, he was brought to this country as a child, and is proud now of his American citizenship. One of the country's leading etchers, his early training included a fellowship from the Spanish Republic, and he has twice been a Guggenheim Fellow. Collections of his work hang in galleries and museums from coast to coast, his one-man shows have been seen from Bombay and Madrid to New York and San Francisco, and among his trophies are first prize in etching by the Associated American Artists and first prize for intaglio print by the Library of Congress. Mr. Castellon is painter, illustrator, and instructor in the fine arts as well, and seems to be somewhat of a cosmopolite, since in World War II he served with the O.S.S. in the China Theatre.

AS WAS THE CASE with Mr. Gorsline's "Behind the Scenes" etching on last Spring's cover, a reproduction of Mr. Castellon's "Voices with a Smile," minus printing and suitable for framing, is available to any telephone man or women who will ask the editor for it. A few of the former are still on hand, and other etchings are to come. It looks as though anyone sufficiently devoted to this business might build for himself—or herself—a "Bell Telephone Magazine Collection."

BUSY AMERICANS, including busy telephone people, are likely to take their periodical reading-matter pretty much for granted—even as you and I. It is gratifying, then, that more than two-score readers, friends and strangers, in the telephone business and out of it, took the trouble to comment favorably of the "new look" they found in last Spring's issue of this MAGAZINE. Of the several variations on that general theme, we liked particularly the reference to keeping the cake and changing the icing, since this comes close to what we were trying to do—and apparently the flavor of the frosting has improved. To all these people we extend out greetings and cordial thanks. Such things are a reward of the editorial task—a heartening experience.

"...to the Service of Our People"

Invocation by the Reverend W. I. Collins, Bishopville, Md., at ground-breaking ceremonies for the new telephone building for the Bishop exchange, March 25, 1954.

Almighty God, our Father, we thank Thee for the freedom of this inherited land and the blessings that have been ours through the years. We are thankful that we live in a land of free enterprise in which men of vision can labor and share in the fruit of that labor; in which men and corporations can dream dreams of empire and have visions of progress. Of such visions and dreams has our land been formed.

We ask Thee to bless with Thy presence this building which we dedicate to the service of our people. That through its good office the call for help in the time of trouble; for aid in the time of sickness; for comfort in the time of death; and for protection in the time of danger, may not go unanswered.

Bless the heads that have conceived the idea, and bless the hands that shall labor here tomorrow and in the years ahead. In all our laborings and in all our planning, we shall give Thee the glory and the praise.

In the name of the Father, and of the Son, and of the Holy Spirit, we dedicate this building to the good of our community and to the well-being of all our people, through Jesus Christ our Lord. Amen.

PRINTED IN U. S. A.